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कुल पेज–114

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ARTICLES IN THIS ISSUE

ANTIBIOTIC RESISTANCE : A GLOBAL CONCERN

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Introduction

Antibiotics played an unexampled role in social and medical development. Antibiotics have saved life of millions of people. Since years, antibiotics have been used for therapeutic as well as prophylactic purposes.The period from the 1950s to 1970s was considered as the golden era for the discovery of novel antibiotics. The beginning of 'modern antibiotic era' was synonymously associated with Alexander Fleming and Paul Ehrlich. Fleming was the first who cautioned regarding penicillin resistance; if used less than prescribed dose. The irresponsible use of antibiotics has contributed significantly to the advent of resistant strains. However, the approach in fighting against the diseases is now diverted on the modification of existing antibiotics to combat emerging and re-emerging micro-organism resistance. Non-judicial use of antibiotics is mostly responsible forantibiotic resistant strains.The antibiotic treatment for drug-resistant bacterial infections is limited, resulting in high morbidity and mortality rate. This article focuses oncauses of antibiotic resistance, consequences and future interventions.

Occurrence of antibiotic resistance

Antibiotics are usually effective against microbes, but when the microbes become less sensitive or resistant, it requires a higher than normal concentration of the same drug to producethat effect. Resistant bacteria multiply even in the presence of therapeutic levels of the antibiotics.Antibiotic resistance has been documented even before the usage of antibiotics in treatment.Methicillin was the first of the semisynthetic penicillinase-resistant penicillin to act against penicillinase-producing Staphylococcus aureus strains. Further, although fluoroquinolones were introduced for the treatment of Gram-negative bacterial infections in the 1980s, later found less sensitive or resistant strains against fluoroquinolones also.

Drivers for transmission of antibiotic resistance

Natural selection is not the only mechanism by which resistance evolves as resistance may also be transferred through plasmid transfer between bacteria. It has been reported that the level of antibioticresistant infections andconcentration of antibiotic consumption are positively correlated. Antibiotics used in agriculture and for treatment purpose are often similar. The use of antibiotics as growth promoters for large animals, pigs and poultry could cause antibiotic resistance and further transmission to animals and humans through the network of food chain. The food chain can be considered as the main route of antibiotic resistant strain transmission to animal and human populations. Antibiotic resistance may also likely to occur if full course of prescribed antibiotic treatment is not followed.

Consequences of antibiotic resistance

Antibiotic resistance is not only a laboratory oriented concern but a global threat responsible for life-threatening infections. World Health Organization (WHO) has warned that a post-antibiotic era may result in infections which lead to death if action against antibiotic resistance not taken. There is no scope to ignore global antibiotic resistance. It has been reported that more than 63,000 patients from United States of America (USA) die every year from hospital-acquired bacterial infections. In Europe, an estimated 25,000 patients die every year due to multiple drug resistance (MDR) bacterial infections in Europe. Regulation and control strategies are not in proper place; antibiotic resistance needs to be targeted at a global level. Developing nations are at the greatest risk. Low prices of antibiotics, easy availability and non-judicial use of antibiotics are responsible for this problem to increase mainly in developing countries. In the developing countries, antibiotic resistant strains causesclinical, economic losses and loss of life. Irrational use of drugs has become a major concern.

Future interventions

A number of important organizations, like the Centers for Disease Control and Prevention (CDC), Infectious Diseases Society of America, World Economic Forum and the World Health Organization (WHO) have declared antibiotic resistance to be a "global public health concern". Treatments for bacterial infections are becoming difficult. Treatment failure is common due to antibiotic resistance and multi-drug resistance. Currently, novel and effective antibiotics are in high demand. Also, passive immunization to prevent bacterial infections have been found effective. Another effective intervention is phage therapy, where bacteriophages are used to treat bacterial infections. Many of antimicrobials to fight antibiotic resistance are in the pipeline for clinical trials. These strategies are aimed not only at targets but rather at the biological networks that may help to create new antibacterial treatment. Organ transplantation, advanced level surgeries, cancer treatment might not have been possible without effective antibiotic treatment. If effective global action plans to combat antibiotic resistance are not adopted soon, then we might encounter complications.

Conclusion

Resistance to an antibiotic develops in no time so it is a matter of concern. With the improvement of technology, more people are now aware of the ill-effects of antibiotic resistance. In the developing world, almost all the antibiotics are available over the counter and can be bought without any medical prescription sometimes. The occurrence of antibiotic resistance is multifaceted, and its consequences pose a threatening global impact. A number of attempts have been made to delineate the diverse aspects of antibiotic resistance. However, mainstream coordinated approach is lacking. Therefore, if the resistance to the antibiotics needs to be curbed, the way shall be to aware the general public, completion of prescribed dosage schedule, judicial use of antibiotics anda well coordinated approach to tackle antibiotic resistance is required.

APPLICATION OF ETHNOVETERINARY PRACTICES& VETERINARY HOMEOPATHY ARYUVEDA IN TREATMENT OF MASTITIS IN DAIRY CATTLE

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Abstract :

The plants form an essential component of ethno-veterinary medicine used in the treatment of different diseases like bovine mastitis. This review article attempts to provide an overview of the different medicinal plants used in the treatment of bovine mastitis. Antimicrobial studies of these plant species and some of their isolated constituents have been reviewed in detail. It highlights the logic and precedence behind mining this important natural product resource.Mastitis is the one of the most common diseases in dairy cattle worldwide causing great economical loss. Mastitis is mainly of bacterial origin. Staphylococcus aureus and Escherichia coli are two most common organisms causing this disease. As the vast use of antibiotics to treat this disease can have harmful impact on human health by consumption of dairy products and also can give rise to antibiotic resistant strains of bacteria, ethnoveterinary medicine can really consider as a better approach to treat it. Therefore, Ricinus communis, Asparagus racemosus., Terminalia bellirica and Piper betle are taken as per traditional knowledge. The inhibitory effects of these were tested against S.aureus and E.coli by using broth dilution method and agar disc diffusion method. So the promising results of this experiment show which can be utilized as a natural antibiotic against mastitis and also it has no or less adverse effect and cheaper in price.

Keyword:Mastitis, herbal drug, ethno veterinary, homeopathy

Introduction :

Mastitis is a inflammation of parenchyma of mammary gland any udder injury that may result in inflammation, causative agents for the inflammatory reaction are microorganisms that have gained entry into the teat canal and mammary tissue. The extent of the infection that occurs as microorganisms multiply and proliferate within the mammary tissue determines the typeof mastitis affecting the cow udder. Bovine mastitis is a disease complex which occurs in acute, gangrenous, chronic, and subclinical forms of inflammation of the bovine udder, and is due to a variety of infectious agents; animal care, hygiene, and management are important factors in this dairy cow disease of great economic importance. Mastitis continues to be the most costly disease of dairy animals. Clinical mastitis is characterized by sudden onset, swelling, and redness of the udder, pain and reduced and altered milk secretion from the affected quarters. The milk may have clots, flakes or of watery in consistency and accompanied by fever, depression and anorexia. The sub clinical mastitis is characterized by having no visible signs either in the udder or in the milk, but the milk production decreases and the Somatic cell count (SCC) increases, having greater impact in older lactating animals than in first lactation heifers. A negative relationship generally exists between SCC and the milk yield (Khan and Khan, 2006). Milk from normal uninfected quarters generally contain below 200,000 somatic cells /ml. A value of SCC above 300,000 is abnormal and an indication of inflammation in the udder. There is a plethora of evidence that the dairy cow milk has a natural level of 100,000-150,000 somatic cells/ml and higher SCC indicates secretory disturbance (Hillerton, 1999). In addition, mastitis impairs the quality of milk and milk products (Philpot, 2003). Field surveys of major livestock diseases have ranked mastitis as number one disease of dairy animals (Khan and Khan, 2006). Mastitis is considered to be the most costly disease of dairy animals affecting the dairy industry.

Causative organisms of mastitis :

In cattle have been reported to be Staphylococci, Streptococci, Escherichia coli, Pseudomonas spp., Corynebacterium, Mycoplasma, Streptococcus dysgalactia, and Mycobacterium tuberculosis. Among all the pathogens of bovine mastitis, Staphylococcus aureus is the predominant organism (Kapur et al., 1992; Allore, 1993). The etiological agents of mastitis in buffaloes have been reported to be Staphylococcus aureus, Staphylococcus hyicus, Staphylococcus epidermidis, Staphylococcus capotus, Streptococcus dysaglactiae, Streptococcus agalactiae, Streptococcus pyogenes and Corynebacterium bovis (Ahmed, 1966; Ghumman, 1967; Qamar, 1992; Allore, 1993; Ahmad, 2001; Akram, 2002; Khan,

2002). The main etiological agents responsible for mastitis infections can be divided into different groups of organisms depending on the source of the organism involved. These include Contagious pathogens, environmental bacteria, opportunistic bacteria and other organisms that cause mastitis less frequently (Philpot, 1999).

Found on the teat surface of infected cows and are the primary source of infection between uninfected and infected udder quarters, usually during milking. Staphylococcus aureus is the species most frequently isolated from bovine mastitis, a disease responsible for significant economic losses all over the world (Oliveira, et al., 1998). The organisms that fit into this category include: Staphylococcus aureus (coagulase positive staphylococci), Streptococcus agalactiae and the less common sources of infection caused by Corynebacterium bovis and Mycoplasma bovis (Quinn, et al., 1999). Environmental pathogens are found in the immediate surroundings of the cow, such as the sawdust and bedding of housed cows, the manure of cattle and the soil. Bacteria include streptococcal strains other than S. agalactiae, such as Streptococcus dysgalactiae, Streptococcus uberis and Streptoccous bavis, Enterococcus faecium and Enterococcus faecalis and coliforms such as Escherichia coli, Klebsiella pneumonia and Enterobacter aerogenes (Schroeder, 2009). Mastitis caused by

Environmental organisms :

The immune system of the host is compromised or if sanitation and hygiene is not adequately practiced (Schukken et al., 2009). Opportunistic pathogens result in mild forms of mastitis and include coagulase-negative staphylococci. The coagulase test correlates well with pathogenicity and strains that are coagulase-negative are generally regarded as non-pathogenic

(Quinn, et al.,1999). These staphylococci occur commensally and may be isolated from milk but usually illicit a minor immune response in cattle and infections caused are slight. They include S. epidermidis, S. saprophyticus, S. simulans (Nascimento, et al., 2005) and S. chromogenes (Vliegher et al., 2003). Many other bacteria and even yeasts may be responsible for causing mastitis, but are less common and occur if conditions in the environment change to increase exposure to these organisms. A condition known as "summer mastitis" occurs mostly in European countries in the summer months when wet, rainy conditions prevail. The source of infection is usually traced to an increase in exposure of the cows to flies in pastures that transmit infecting Arcanobacterium pyogenes and Peptostreptococcus indolicus strains and is more common in non-lactating cows (Sol, 1984). Mastitis caused by Pseudomonas aeruginosa is often traced to contaminated water sources and will result in a condition similar to coliform mastitis infections where endotoxemia occurs. Nocardia asteroides causes severe cases of mastitis resulting in fibrosis and permanent damage to mammary tissues (Quinn, et al., 1999). Treatment is usually ineffective and has a high mortality rate occurs. The source of the infection caused by Nocardia asteroides is usually from the soil and could be prevented by ensuring that effective sanitation measures are enforced before treatment with intramammary infusions (Philpot and Nickerson, 1999). Less common causes of bovine mastitis include Bacillus cereus, resulting in peracute and acute mastitis and also the human pathogens Streptococcus pyogenes and S. pneumonia that causes acute mastitis and is accompanied by fever symptoms in the host (Quinn, et al., 1999)

Herbal treatment of mastitis :

Medicines that are extracted from the herbs are used as intramammary infusion in the dry animals. They are "natural" and usually safe and have clinical and economical value in treating resistant bacteria (Buhner, 2014). The herbal treatment tested for dairy cows in the dry period is found to be an alternative to antibiotics (Mullen et al., 2013). Baskaran et al. (2009) demonstrated that plant derived antimicrobials have shown promise in vitro as treatments for mastitis; trans-cinnamaldehyde (from cinnamon bark), thymol (from oregano oil) and eugenol (from clove oil) were shown to be effective in milk cultures versus several major mastitis pathogens. Cinnamon and clove oils have shown antibacterial and antifungal activity for bovine mastitis (Choi et al., 2012).

Neem oil is effective against udder infections. The bark, seeds, leaves and roots of neem are used as an insect repellant. Livestock insects such as horn flies, flow flies and biting flies are controlled traditionally using neem (Ogbueniu et al., 2011). Neem oil are effective against E. coli and mastitis (Ogbueniu, 2008). Neem (Azadiracta indica) can be used as anti-inflammatory and antibacterial drug and can be an alternate therapy against bovine mastitis. Gram positive bacteria especially Staphylococcus aureus is sensitive to essential oil derived from turmeric (Gupta et al., 2015). Nigella sativa extract has potential as a therapeutic agent for Staphylococcus aureus infection causing sub clinical mastitis of dairy cows and may contribute to the cow's recovery from mastitis (Azadi et al., 2011). It has been reported that milk somatic cell count of the quarters infected with Staphylococus aureus decreased after injection of Nigella sativa extract

in Holstein cows (Azadi and Farzaneh, 2010). Herbal preparation had a positive effect on the time to recovery from mastitis and increased the rate of bactereological cure together with improving the reduction of somatic cell count in dairy cows Pinedo et al. (2013). Mullen et al. (2014) reported that the herbal treatment tested did not negatively affect milk production or somatic cell count and were just as successful as conventional dry cow therapy in curing infections during the dry period. Cows treated with the herbal preparation at dry off had fewer new infections (35%) than no treatment (49%). Thyme oil, an ingredient of the herbal treatment, has significant antibacterial activity when cultured in milk.

The role of cytokines in the pathophysiology of bovine mastitis has been the subject of many studies. Cytokines play a central role in the regulation of immune responses against different infections and variations in their expression are often associated with disease activity in immune-mediated or inflammatory disorders. Modulation of cytokine secretion may offer novel approaches in the treatment of a variety of diseases. One strategy in the modulation of cytokine expression may be through the use of herbal medicines. A class of herbal medicines, known as immune-modulators, alters the activity of immune function through the dynamic regulation of inflammatory molecules such as cytokines.

A variety of germicides such as iodine, chlorhexidine, sodium hypochlorite etc. have been tried successfully as teat dips in preventing new intra mammary infections. However, one major concern that remains with these dips is the possible passing of disinfectant of residues in milk. For this reason, use of herbal medicine as teat dip may be the best answer. Even the WHO has emphasized on the use of the medicinal plants for management of mastitis as they are safer than the synthetic drugs. The Herbal teat Dip developed is much cheaper than the products available in the market.

Use of homeopathy in treatment of bovine mastitis :

Homeopathy is based on three principles: the similia principle, drug testing with healthy humans and dilution of doses, which were developed by the German doctor Samuel Hahnemann. According to Hahnemann's observations during drug testing, the simile is able to initiate a healing, which causes symptoms in the examination of healthy people, which are as similar as possible to the symptoms of the patient (Similia similibus curentur) (Braun 1995). Homeopathic remedies are potentiated drugs of components of plants or minerals for example, which effects are tested in drug trials on healthy people. These results are transferred to veterinary medicine, because there are rarely any homeopathic drug tests on animals (Ekert 2013). The preparation of homeopathic remedies consists of dilution and shaking or trituration of the active substance with a carrier substance. According to homeopathic understanding, the healing power contained in the drug are released through mechanical processing and strengthened with each potentiation step.

PIS MELLIFICA:

Erysipelatous inflammation of the mammary gland
Swelling and hardness of the mammae threatening to ulcerate
Parts are swollen, puffed up; becomes oedematous and of shiny, red rosy colour
Decreased thirst
Aggravated by heat, touch, pressure and relieved by cold application

CONIUM MACULATUM

Glands especially mammary gland is affected with engorgement and stony induration
Ill effects of contusion and blows
Chronic form of mastitis
Inflammation of the mammary gland
Scirrhus of the mammary gland after contusion

BRYONIA ALBA

Mammary gland swelling hard and indurated
In acute forms pain will be relieved by pressure on the udder where the animal lies down frequently
Mammary gland hot, painful and hard
Stony hard mammae
Milk fever
Aggaravated by motion relieved by pressure and lying down

ARNICA MONTANNA

Mastitis as a result of injury to the udder tissue

Bloody secretion

Aggaravated touch and motion. Relieved by lying down

PHYTOLACCA

A useful remedy for both acute and chronic forms

Heavy, stony hard, swollen and tender mammae

Bluish red glands

Discharge of pus which is watery, foetid and ichorous

In acute form curdled milk and clots. In chronic form small clots may appear

Conclusion :

Inflammatory molecules and many of their receptors may turn out to be modulated by plants and in that event the herbal medicines would have therapeutic potential for future. The results of in-vivo research suggest that the botanical medicines modulate cytokines and thus it may be concluded that Mastilep topical herbal gel possesses antibacterial and immune-modulatory activities against bovine sub-clinical mastitis. These facts are supported by reduction in total bacterial count and enhancement of cytokine expression of somatic cells in bovine mammary gland in response to the herbal therapy. The present work supports its use as alternative herbal therapy against bovine sub-clinical mastitis and may elucidate the mechanism of action for many of its therapeutic effects.

APPLICATION OF ETHNOVETERINARY PRACTICES& VETERINARY HOMEOPATHY ARYUVEDA IN TREATMENT OF MASTITIS IN DAIRY CATTLE

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Abstract :

The veterinary and animal husbandry practices were present and grown in the Vedic, Puranic and extending beyond Epic periods. This knowledge is available in the form of manuscripts called Veterinary Ayurveda, viz Mrugayurveda (Ayurveda for Animals) Pashupakshishastra (Ayurveda for birds), Hasthyayurveda elephants), Ashwayurveda (Ayurveda for horses) etc. Understanding the etiopathogenesis and management of animal diseases through Ayurveda is need of the day. Many herbs and formulation from Ethno knowledge and Ayurveda were in practice in ancient India. So it is important to validate and reintroduce these time tested formulations and herbs for animal health. Bovine mastitis is globally recognized as the most common and costly disease affecting dairy herds. The disease causes huge ?nancial losses to dairy industries by reduced yield and milk quality, deaths and culling of affected cows and also by associated treatment costs. The disease occurs due to invasion of the mammary glands by pathogenic bacteria followed by their multiplication in the milk producing tissue. Medicinal plants with their well-established history are an excellent natural product resource used as an alternative therapy. Antibacterial agents from plants can act as important sources of novel antibiotics, efflux pump inhibitors, compounds that target bacterial virulence or can be used in combination with existing drugs. The plants form an essential component of ethno-veterinary medicine used in the treatment of different diseases like bovine mastitis.

Keywords : Ethnoveterinary, mastitis, herbal preparation, homeopathy

Introduction :

Mastitis is a multi-etiological and complex disease, which is defined as inflamma-tion of parenchyma of mammary glands. It is characterized by physical, chemical and, usually, bacteriological changes in milk, and pathological changes in glandular tissues (Radostis et al., 2000). The occurrence of disease is an outcome of interplay between three major factors: infectious agents, host resistance, and environmental factors (Gera and Guha, 2011).Mastitis is a global problem as it adversely affects animal health, quality of milk and the economics of milk production, affecting every country, including developed ones and causes huge financial losses (Sharma, Maiti and Sharma, 2007). There is agreement among authors that mastitis is the most widespread infectious disease in dairy cattle, and, from an economic aspect, the most damaging (Tiwari et al., 2010; Sharma et al., 2012; Elango et al., 2010; Halasa et al., 2007; Mostert et al., 2004).

Clinical and sub-clinical mastitis are the two major forms of the disease :

- Clinical mastitis results in alterations of milk composition and appearance, decreased milk production, and the presence of the cardinals signs of inflam-mation (pain, swelling and redness, with or without heat in infected mammary quarters). It is readily apparent and easily detected.
- In contrast, detection of mammary quarters with sub-clinical mastitis is more difficult because signs are not readily apparent (Kivaria, 2006) and, because of the lack of any overt manifestation, its diagnosis is a challenge in dairy animal management and in veterinary practice.

Risk Factors : Hosts, Management Practices, Environment :

Mastitis is a difficult problem to comprehend because, as noted earlier, it is a disease caused by many factors, both in large and in small-scale herds. Micro-organisms are responsible for the infection, but for them to enter the mammary gland and establish themselves to the point that they cause an infection, a multitude of factors may be involved. There are many factors acting simultaneously, and the disease generally involves interplay between management practice and infectious agents, but with other factors, such as genetics, udder shape or climate. (Awale et al., 2012; Sori, Zerinhum and Abdicho, 2005).

Occurrence of mastitis is generally higher in high yielding bovines. Holstein Friesian (HF), Jersey or HF and Jersey crossbred dairy cows are generally more susceptible to mastitis than indigenous breeds. Seasonality in the incidence of mastitis has been studied. The occurrence of mas-titis varies from season to season, because growth and multiplication of organisms depends on specific temperature and humidity. Incorrect ventilation, with high temperature and relative humidity, encourages the multiplication of various bacteria. Exposure of animals to high temperature can increase the stress of the animal and alter immune functions (Sudhan and Sharma, 2010). Joshi and Gokale reported that, in India, animals were more prone to SCM in the monsoon season compared with summer or winter (Joshi and Gokale, 2006). This matches the findings of Patil and co-workers (2005) related to buffaloes in Karnataka State, India. Similarly, in Ethiopia, it was noticed by Dego and Tareke (2003) that the prevalence was higher in the rainy season than in the dry season

Major Causative Agents : Contagious and Environmental Pathogens

Mastitis is caused by several species of common bacteria, fungi, mycoplasmas and algae (Batavani, Asri and Naebzadeh, 2007). Most mastitis is of bacterial origin, with just a few of species of bacteria accounting for most cases. Mastitis pathogens are categorized as contagious or environmental (Kivaria, 2006). Contagious patho-gens live and multiply on and in the cow's mammary gland and are spread from cow to cow, primarily during milking.

Contagious pathogens include : Staphylococcus aureus, Streptococcus agalactiae, Mycoplasma spp. and Corynebacterium bovis (Radostis et al., 2000). Environmental mastitis can be defined broadly as those intra-mammary infec-tions (IMI) caused by pathogens whose primary reservoir is the environment in which the cow lives (Smith, Todhunter and Schoenberger, 1985). The most fre-quently isolated environmental pathogens are Streptococci, other than S. agalac-tiae, commonly referred to as environmental streptococci (usually S. uberis and S. disgalactiae) and gram-negative bacteria such as Escherichia coli, Klebsiella spp. and Enterobacter spp. (Hogan et al., 1999).

Mycotic infections are another important cause of mastitis. In an unpublished study, mentioned in a paper from Kivaria and Noordhuizen (2007), it was estab-lished that 90% of small-scale dairy farmers in Tanzania were unaware of the causal factors of mastitis and so did not know how to prevent the disease. Many available studies in developing countries had the aim of conducting microbiological inves-tigations to understand each pathogens role in causing mastitis in different areas.

It is important to remember that contagious mastitis prevalence is considerably influenced by the milking procedures followed by milkers. Thus correct milking procedures such as milking mastitic cows last, and proper sanitation of utensils, milker's hands and udder before milking could help to improve the situation. The frequency of isolation of coliforms (E. coli, Enterococcus faecalis, etc.) and other micro-organisms causing environmental mastitis is usually directly influenced by unhygienic housing conditions (Mekonnen and Tesafaye, 2010).

Treatment with homeopathic drug :

As in humans even for the cows the totality has to be obtained and the individual remedy has to be administered accordingly. Here the symptoms are obtained by the objective symptoms, observation of the behaviour and also the animal's reaction to the disease. And the medicines are administered through tongue, in drinking water or through injection rarely.

The most commonly indicated medicines are as follows:

Belladonna :

- In acute form of mastitis
- Swelling, redness, hardness and tenderness
- Bounding pulse with rise of temperature
- Mastitis after postpartum
- Aggravated by touch, motion and pressure

Apis mellifica :

- Erysipelatous inflammation of the mammary gland
- Swelling and hardness of the mammae threatening to ulcerate
- Parts are swollen, puffed up; becomes oedematous and of shiny, red rosy colour

- Decreased thirst
- Aggravated by heat, touch, pressure and relieved by cold application

Conium maculatum :

- lands especially mammary gland is affected with engorgement and stony induration
- Ill effects of contusion and blows
- Chronic form of mastitis
- Inflammation of the mammary gland
- Scirrhus of the mammary gland after contusion

Bryonia alba :

- Mammary gland swelling hard and indurated
- In acute forms pain will be relieved by pressure on the udder where the animal lies down frequently
- Mammary gland hot, painful and hard
- Stony hard mammae
- Milk fever
- Aggaravated by motion relieved by pressure and lying down

Arnica montanna :

- Mastitis as a result of injury to the udder tissue
- Bloody secretion
- Aggaravated touch and motion. Relieved by lying down

Phytolacca:

- A useful remedy for both acute and chronic forms
- Heavy, stony hard, swollen and tender mammae
- Bluish red glands
- Discharge of pus which is watery, foetid and ichorous
- In acute form curdled milk and clots. In chronic form small clots may appear

Silicea:

- Chronic cases of corynebacteri pyrogens infection where multiple abscesses are formed
- Bloody discharge from mammary gland aggravated by nursing
- Hard lumps, fistula in mammae
- Threatened abscesses of mammae
- Suppurative processes, stubborn, fistulous openings
- Aggravted by cold and dampness

Urtica urens:

- Acute forms of mastitis showing oedema which may be in the form of plaques frequently extending to the perineal area
- Great swelling of mammae with serous discharge and followed by copious milk production
- Dimnished secretion of milk after parturition

Ayurvedic Treatment of Mastitis:

In Ayurveda, mastitis is also known as Sthanavidhradi, a disease of pitta origin, the drugs used in this formulation (Aloe vera, Curcuma longa and Calcium hydroxide) means three ingredients viz. Gheekumari (Aloe vera) 2 or 3 petal, Haldi (Turmeric) powder (50gm) and Chunna (Lime stone)- 10 gm is potent pitta shamaka (Pacifies Pitta humour). The formulation possesses Krimighna (antimicrobial), Vranashodaka (wound cleanser), Vranaropaka (wound healing), Shothahara (anti-inflammatory) and Srotoshodaka (channel cleanser) properties. Hence, mastitis can be efficiently

managed with this formulation by application of such paste at least for 7-10 days. Sometimes oral administration of 50 gm of baking soda (sodium bicarbonate) with two lemon juice dissolved in 200 ml of water is also effective in treating the mastitis during early stage.

Herbal Preparations :

Medicines that are extracted from the herbs are used as intramammary infusion in the dry animals. They are "natural" and usually safe and have clinical and economical value in treating resistant bacteria (Buhner, 2014). The herbal treatment tested for dairy cows in the dry period is found to be an alternative to antibiotics (Mullen et al., 2013). Baskaran et al. (2009) demonstrated that plant derived antimicrobials have shown promise in vitro as treatments for mastitis; trans-cinnamaldehyde (from cinnamon bark), thymol (from oregano oil) and eugenol (from clove oil) were shown to be effective in milk cultures versus several major mastitis pathogens. Cinnamon and clove oils have shown antibacterial and antifungal activity for bovine mastitis (Choi et al., 2012).

Neem oil is effective against udder infections. The bark, seeds, leaves and roots of neem are used as an insect repellant. Livestock insects such as horn flies, flow flies and biting flies are controlled traditionally using neem (Ogbueniu et al., 2011). Neem oil are effective against E. coli and mastitis (Ogbueniu, 2008). Neem (Azadiractaindica) can be used as anti-inflammatory and antibacterial drug and can be an alternate therapy against bovine mastitis. Gram positive bacteria especially Staphylococcus aureus is sensitive to essential oil derived from turmeric (Gupta et al., 2015). Nigella sativa extract has potential as a therapeutic agent for Staphylococcusaureus infection causing sub clinical mastitis of dairy cows and may contribute to the cow's recovery from mastitis (Azadi et al., 2011). It has been reported that milk somatic cell count of the quarters infected with Staphylococus aureus decreased after injection of Nigella sativa extract in Holstein cows (Azadi and Farzaneh, 2010). Herbal preparation had a positive effect on the time to recovery from mastitis and increased the rate of bactereological cure together with improving the reduction of somatic cell count in dairy cows Pinedo et al. (2013). Mullen et al. (2014) reported that the herbal treatment tested did not negatively affect milk production or somatic cell count and were just as successful as conventional dry cow therapy in curing infections during the dry period. Cows treated with the herbal preparation at dry off had fewer new infections (35%) than no treatment (49%). Thyme oil, an ingredient of the herbal treatment, has significant antibacterial activity when cultured in milk.

Conclusion :

Subclinical mastitis in dairy cows can be controlled during the dry period by proper management. It can be best achieved by the use of herbal preparations on the animals through intramammary route and external application. Therefore, it can be considered as an alternative approach and consider as a farmers friendly management practices for controlling subclinical mastitis in dairy cows.

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Application of Ethno-veterinary Practices and Veterinary Homeopathy, Veterinary Ayurveda in Treatment of Mastitis in Milch animal

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Abstract

Mastitis is one of the most common infectious diseases of bovines characterized by inflammation in the mammary gland including swelling, redness, and painful and deterioration of milk quality. It is a bacterial disease which invaded cell of mammary gland and cause swelling, hot and redness of udders. Mastitis mainly causes by bacteria i.e. Staphylococcus aureus, coagulase-negative Staphylococcus, Streptococcusuberis, Streptococcusdyslactiae, and Streptococcusagalactiaeand Mycoplasmas. Without being treated this infection can lead to major economic lost in diary industry. Recently, antibiotic resistance in animals is worldwide problem and drug residual are dangerous for humans health as antibiotic residues present in animal origin food products. Hence, there is need of alternative treatments of mastitis in milking animal in order to overcome this problem. Homeopathic and Ayurvedicmedicine are most suitable for the treatment of the mastitis.

Keywords : Mastitis, Etiology, Antibiotic residual, Homeopathy and Ayurveda

Mastitis is one of the most common endemic and infectious diseasesof bovines. Mastitis is an inflammation the mammary gland tissues of the buffalos and cattle characterized inflammation in the mammary gland including swelling, redness, and painful and deterioration of milk quality. It is a bacterial disease which invadedcell of mammary gland and cause swelling, hot and redness of udders. Mastitis are sub-categorized in sub-clinical, clinical, and chronic forms, depends on the severe level of the inflammation (Pasca et al., 2017). According to Bradley (2002) animal management practices and milking are the risk factors of the mastitis. Animals play a vital role in the human economy. Without being treated this infection can lead to major economic lost in diary industry.Today's antibiotic resistance in animals is very giant problem thatare dangerous for humans health as there are many antibiotic residues present in animal origin food products. Hence, there is need of alternative treatments of mastitis in milking animal in order to overcomethis problem. Recently, medicinal value of plants worldwide accepted and as used as a new alternative approach for curing the animals from illness including against Mastitis. These are cost effective as well as free from antimicrobial residue. Natural herbs were only the way to prevent, treat and cure the animal healthcare in ancient time since the domestication of various livestock species were started. Allopathy came into existence after long time of domestication of livestock. They were totally dependent on natural plants, herbs and shrubs. Ancient people had huge knowledge and vast experience of antifungal, insecticidal,antibacterial, and antioxidant properties of the plant. Uses of natural medicinal plants, herbs and shrubs to treat the animal healthcare are known as ethno-veterinary practices. It is well practices in India from Vedic time. Many evidence of cattle rearing are found in Rigved (1500- 1000 BC) and Atharvaveda is the best witness of herbal medicine to treat for diseases of humans as well animals.

Etiology

Mastitis mainly causes by bacteria i.e. Staphylococcusaureus, coagulase-negative Staphylococcus, Streptococcus uberis, Streptococcusdyslactiae, and Streptococcusagalactiaeand Mycoplasmas. Secondary bacterial infection may occur.On the bases of source of infection Mastitis subdivided into two categories i.e. 1) Contagious mastitis2) Mastitis from environmental infection. On the bases of severity of infection mastitis can be divided into different categories

1) Subclinical mastitis

i. Most commonly associated with S. aureus, Strep. Spp.
ii. There are notany observation ofsignsand symptoms of inflammation of the organs and milk.
iii. Diagnosis is made on the basis on an increase in somatic cell counts in the milk.

2) Clinical mastitis

i. Signs and symptoms like fever and depression could be observed.
ii. Mammary gland inflammation (redness, heat, swelling, pain)
iii. Physical changes in the milk may start and may be from a few milk clots to appearing like serum with clumps of fibrin.

3) Acute mastitis

i. Most commonly associated with Coliform organisms such as E. coli, Klebsiella and Strep Spp
ii. Clinical signs (fever, depression, loss of appetite) are severe
iii. The udder is swollen, hard and painful.
iv. The milk may contain clots or flakes and can be watery, serous or purulent.

4) Acute gangrenous mastitis

i. Most commonly associated with S. aureus, Cl. Perfringens, and E. coli.
ii. Anorexia, dehydration, depression, fever and signs of toxaemia, sometimes leading to death.
iii. Early in the disease, the gland is red, swollen and warm
iv. Within a few hours the teat becomes cold
v. The secretions become watery and bloody
vi. The mammary gland becomes necrotic

5) Chronic mastitis

i. Most commonly caused by Staphylococci, S. aureus, and S. uberis.
ii. Clinical signs are varies with no clinical signs to severe symptoms.
iii. Milk periodically contains clots, flakes or shreds of fibrin.
iv. The Somatic Cells Count is elevated.

Diagnosis

I. Diagnosis supported by clinical signs and symptoms
   1) Abnormalities in milk,
   2) Swelling of the udder (tender to the touch) and general signs of illness (fever, depression, loss of appetite) and in many cases a reduction in milk production.

II. California Mastitis Test (CMT): Mastitis detect at early stage of the disease (sub clinical) before the sign and symptoms observed,

Treatment

According to Ayurveda, mastitis is pitta origin disease and described as a word Sthanavidhradi. Treatment completely based on the natural plants and products. Atinitial a combination of Aloe-vera, Curcuma longa and Calcium hydroxide used for curing of mastitis.Aloe-vera attributed antimicrobial and anti-inflammatory activity and also decrease the production of TNF?, inhibit PGF2? and TB4. Curcuma longa's active principle is Curcumin that inhibit LOX pathway and decreases the formation of leukotriene. Calcium hydroxide has anti-inflammatory properties that reduces edema formation. Although,formulation changes over the period of time on the up-gradation of knowledge of humanbeing and discov-

ery of new medicinal plants.A different formulation also make from Krimighna (antimicrobial), Vranashodaka (wound cleanser), Vranaropaka (wound healing), Shothahara (anti-inflammatory) and Srotoshodaka (channel cleanser). Hence, mastitis can be efficiently managed with these formulations. There is urgent need to dissemination of these traditional veterinary practices at commercial level.

Veda and Purans are the excellent witness of the veterinary Ayurveda. Theseveterinary practices are available in the form of manuscripts vizMrugayurveda (Ayurveda for Animals),Pashupakshishastra (Ayurveda for birds), Hasthyayurveda (Ayurvedafor elephants), Ashwayurveda (Ayurveda for horses) etc.Application of root of Citrulluscolocin this relievespain and Curcuma Tonga and Do tuna metel.

Mastitis treatment forinfectedanimal in sub-Saharan Africa

2. Paste of non-poisonous wood ash (0.25 kg) and water (0.5 l lit) applied and massage on udder of infected animals.
3. Make a solution of half kg leaves of Clematis hirsute and Scheffleraabyssinica in Water and clean udder after the milking of infected animal twice in a day.
4. YXT extract also used for curing of mastitis. It prepared from A. dahurica and R. officinale, which have antibacterial and anti-inflammatory properties, respectively.Procedure to make YXT extract: powder of A. dahurica (100gms) and R. officinale (100grm) mixed in 800 mL of ethanol (70%), and heated at 70□C for 24 hour. After that centrifuged at 10,000 □ g for 15 minutes, and remove the whole ethanol from supernatant.

HOMEOPATHY

Homeopathic drugs are mainly administered orally with feed or water.

Drugs for prevention

1. Nosodes administered orally to immunized herd from mastitis. Nosode is mainly effective for subclinical mastitis.
2. Combinations of Belladonna, Bryonia and UrticaUrens, and Phytolacca, Sulphur, Silicea and Carbovegetabilis.

Drugsfor treatment

1. Belladonna used for the curing of acute post-partum mastitis with signs of red, hot and painful udder mean inflammatory udder.
2. Aconitum used in acute case of mastitis.
3. Bryonia Alba is good for treatment of chronic mastitis with sign of swollen and hard udder and low intensive pain.
4. Arnica Montana used for treatment of injured udder when blood ooze out.
5. ApisMellifica used in case of oedematos udder usually after first calving.
6. BeliaPerennis has similar use of Arnica but in case of deeper injuries.
7. Combination of belladonna and Lachesis used for violet mammary gland, infiltration of underlying tissue with lateral preference.
8. Combination of Lachesis and Carbolicumacidum used for treatment of Gangrenous mastitis
9. ViperaReddi used as remedy from acute inflammation with edema, swollen veins, gangrenous tendency, extremely painful and cold in touch
10. Phytolacca alternating with Conium used for curing from hard and painful udder, retromammary ganglia and cracking of teats
11. Silica used to dry the pus.

Homeopathic treatment in the case of clinical mastitis, particularly that caused by E. coli,

1. Initial treatment: combination of Aconitum D4, Phytolacca D1 and Bryonia D4
2. Subsequent treatment: combination of Phytolacca D1, Bryonia D4, Lachesis D8 and Mercuriussolubilis D4.

Conclusion

Used of medicinal plants for treatment of disease totally depends on the availability in that geographical areas. Method of drugs administration, nature and extraction process change with up-gradation of knowledge over the period of time. Medicinal plants use as alternative of allopathic medicine because of effective, low cost, less harmful to the health and with no side effect.

APPLICATION OF ETHNOVETERNINARY PRACTICES AND VETERNINARY AYURVEDA IN TREATMENT OF MASTITIS IN DAIRY CATTLE

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Abstract

According to ancient data, numerous countries had different methods and traditions for dealing with animal ailments. In India, veterinary science has a 5000-year history. On different elements of veterinary care, such as health management of cattle, horses, and birds, there is codified veterinary knowledge in the form of medical writings and manuscripts. This information is preserved in manuscripts known as Veterinary Ayurveda, such as Mrugayurveda, Pashupakshishastra and so on. Ayurveda can help us understand the etiopathogenesis and treatment of animal ailments. Mastitis is a condition that causes economic hardship in dairy cows. A single disease might cost up to 7500 crores INR each year in losses. Ayurvedic saints, known as Sthanavidhradi, give detailed explanations of mastitis. The classics of Ayurveda clearly outline management and therapeutic procedures. It's been around for a long time. The current issues in mainstream medicine can be addressed by this robust medical system. Ancient India used a variety of plants and formulations from ethnomedicine and Ayurveda. As a result, it's critical to revalidate and reintroduce these tried-and-true animal health formulas and herbs.

Key words : Ayurveda, Dairy cows, Ethnomedicine, Mastitis.

Introduction:

Animal healthcare is as old as the domestication of numerous livestock species, according to ethnoveterinary or traditional medicine. In India's villages, there exist a variety of rich and effective ethnoveterinary traditions that are a significant aspect of family life and play social, religious, and economic function.In terms of Ayurveda mastitis is mostly a pitta dosha (Ayurvedic name) dominating condition. Pitta is one of the doshas (morbid factors present in the body) that causes disease. Mastitis is also known in Ayurveda as Sthanavidhradi, a pitta-related ailment, and the medications in this formulation are effective pittashamaka. According to estimates, the demand for veterinary healthcare products is between Rs. 7600 and Rs. 10,500 million. Only 20% of cattle owners have access to modern veterinarian treatment. As a result, there's a lot of room for developing standardized herbal products for veterinary medicine. The application of Ethnoveterinary and Ayurvedic practices can resolve various drawbacks such as :

1. Cost for treatment of dairy animals can be reduced
2. Level of drugs, antibiotics and chemicals in the milk can be minimized.
3. Can help the local producers to contribute to the economy
4. Timely help can be given to the farmers by the veterinarian.

Mastitis is a condition that causes economic hardship in dairy cows. A single disease might cost up to 7500 crores INR each year in losses. Ayurvedic saints, known as Sthanavidhradi, give detailed explanations of mastitis. The classics of Ayurveda clearly outline management and therapeutic procedures. The goal of this study is to explain ethnic and Ayurvedic perspectives on mastitis, the most economically destructive disease. Ayurveda and Veterinary Ayurveda are also linked. Aloe vera, Ca(OH)2 and Curcuma longa, are commonly used in medicinal formulations, with properties such as Krimighna (anti-microbial), Vranashodaka (wound cleaning), Vranaropaka (wound healing), and Shothahara (anti-inflammatory). As a result, this mixture can effectively manage mastitis.The modern and Ayurvedic ways of treating mastitis is different.

In the modern practices, there are three stages of mastitis development :

1. The first step is the invasive phase, in which the bacteria can penetrate the teat orifice and become established in the teat canal and cistern.
2. The organisms are able to overcome the immune system and multiply in the second phase, infection.

3. The third phase is the inflammatory phase, in which the organism infiltrates the udder.

In Ayurvedic medicine, they have classified mastitis into two types namely: Sthanavidradhi and Sthanakilaka.

Etiology and clinical features of mastits :

Disease	Etiology	Clinical featutre
Mastitis	"	Incomplete milking from the udder that is, presence of residual milk in the udder
	"	Trauma or insect bite on the udder
	"	Excessive feeding on tender plants of avarechiguru (Dolichos sp.) and kaakijola (maize stalk)
	"	Unhygienic condition of the cattle shed and feeding methods
	"	Ingestion of worms
	"	Evil eye on the high milkyielding udder of the cow

Local changes : reddish swollen udder with extreme pain and tenderness at times, hard and warm to touch o Milk changes: milk is often yellow or curdled, has blood tinge at times and also a few suspended particles are seen in milk of the affected udder.

Other opinions :

1st stage : saltish taste of milk 2nd stage: curdled milk 3rd stage: hard udder, less milk yield

Others : the outer ear (pinna) is also thickened; fever and animal is off its feed and looks dull

Ayurvedic treatments for mastitis :

1. Wattakakavolubilis (leaves and stem) paste is applied externally to the affected udder:- The involvement of the pitta dosha is primarily responsible for any inflammation. The inflammatory and suppurative nature of kechalabaavu, or mastitis, infers the predominance of pitta dosha. Pitta dosha is relieved by the plant Wattakakavolubilis. As a result, this treatment for mastitis should work.
2. Wattakakavolubilis (stem) and Commelinabenghalensis (leaves) paste are applied to the affected udder from the outside:- Along with Wattakakavolubilis, Commelinabenghalensis is used in this composition. Commelinabenghalensis possesses antibacterial activity against Pseudomonas, Staphylococcus, E. coli, and Bacillus subtilis, according to contemporary pharmacological investigations. As a result, there is some evidence that this composition can help with mastitis.
3. A handful of Andrographisserpyllifolia (leaves and roots), flakes of Allium sativum bulb, and Piper nigrum mashed to a paste and taken orally three times per day for nine to twenty days:- This formulation is not proven to be effective.

Two of the three formulas listed above have literary backing from an ISM (Ayurveda) and modern pharmacology. Only one formulation has no ISM or current pharmacology to back it up. However, this does not rule out the possibility of success. Concerning the health practice, the community's opinion must be asked, if it is discovered that the health practice is beneficial.

Various plants that are used in the treatment of mastitis are listed below :

Plant family	**Plant species**
Alliaceae	Allium sativum L.
Apiaceae	Foeniculumvulgare Mill.
Asteraceae	Cuminumcyminum L.
Brassicaceae	Lepidiumsativum L.
Brassicaceae	Brassica campestris L.
Capparidaceae	Capparisdeciduas (Forssk.)
Compositae	Centratherumanthelmisticum L.
Cucurbitaceae	Citrulluscolocynthis (L.) Schrad.
Linaceae	Linumusitatissimum L.

Malvaceae	Gossypiumhirsutum L.
Papilionaceae	Trigonellafoenumgraceum L.
Pedaliaceae	Sesamumindicum L.
Poaceae	Triticumaestivum L.
Poaceae	Oryzasativa L.
Poaceae	Saccharumofficinarum L.
Polygonaceae	Polygonumbistorta L.
Ranunculaceae	Nigella sativa L.
Rosaceae	Rosa indica L.
Rubiaceae	GaliumaparineL.
Rutaceae	Citrus limon (L.) Burm.f
Solanaceae	Capsicum annuum L.
Zingiberaceae	Zingiberofficinale Roscoe
Zingiberaceae	Curcuma longa L.
Zingiberaceae	AmomumsubulatumRoxb.
Zygophyllaceae	Peganumharmala L.

Conclusion :

Ethnoveterinary medicine is extremely relevant in today's world. In four different geographical regions in Southern India, a fast participatory assessment technique for identifying best practices was designed and tested. During this study, almost 120 plant resources were investigated for nearly 20 health disorders. Seventy percent of the cures had positive proof from several medical systems and personal experience. Fifty percent of the treatments' ingredients are easily grown in home herb gardens and are readily available in the area. There are no further cures.Pilot clinical studies have resulted in items that are now being manufactured by local businesses. This program has now been effectively implemented by the National Diary Development Board (NDDB) of the Government of India. The method reveals that, if broadly promoted, this concept can be extremely beneficial to rural populations. We believe that revitalizing ethnoveterinary theory and practice is the key to improving animal health and, as a result, rural India's animal producers' prosperity.

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AVIAN INFLUENZA: A Threat To Poultry

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Introduction

Bird flu is a viral disease of poultry caused by Orthomyxo virus. It is also called avian influenza or avian flu or fowl plaque. It is highly contagious disease of poultry. This disease infects domestic poultry, pet, zoo, and wild birds. It effects birds of any age but mortality rate is high in young birds. There are two type of avian influenza viruses Low pathogenicity influenza virus which is less pathogenic and typically cause respiratory signs such as gasping, ocular and nasal discharge and swollen infraorbital sinuses and decrease in egg production. High pathogenicity influenza virus cause high mortality and entire flock can die within night or few days without showing any significance signs. This virus transmitted by faecal/ oral route. Infected bird excretes virus from respiratory tract, conjunctiva and faeces and bird may infected by eating contaminated feed and water. Disease is characterised by respiratory signs such as sneezing, coughing, ocular and nasal discharge, and swollen infraorbital sinuses, decreased egg production, Cyanosis of comb and wattle, Oedema of face, Respiratory distress, Convulsions, blindness and paralysis. Disease can be diagnosed by clinical sign and symptom, high death rate within few days, Post-mortem examination and confirmation of disease by lab diagnosis. Disease can be prevent and controlled by vaccine programme in available, maintain hygienic condition, remove of infection flock and bedding material and fumigation of utensils.

Etiology

Fowl plaque is caused by avian influenza viruses Type AOrthomyxoviruses. These viruses occur naturally among wild aquatic birds worldwide and can infect domestic poultry and other birds. Avian influenza A viruses are very contagious among birds and some of these viruses can sicken and even kill certain domesticated bird species including chickens, ducks, and turkeys. Orthomyxoviruses classified into the following two categories: Low pathogenicity influenza virus and High pathogenic avian influenza virus. Low pathogenicity avian influenza viruses are less dangerous and causesless mortality and mild illness sometimes illness may not be detect. It mainly effects birds which are rare in backyard system or in villages. Infection of poultry with HPAI viruses can cause severe disease with high mortality. Both low and high pathogenic influenza viruses can spread rapidly through poultry flocks.

Transmission

The virus is transmitted by direct contact between infectedand susceptible birds or indirect contact through aerosol droplets or exposure to virus-contaminated fomites.The main route of transmission is faecal/oral route but aerosolgeneration from the respiratory tract is also a significant mode oftransmission because of high virus concentrations in the respiratory tract, but the large volume of lower concentration influenzavirus in faeces of infected birds contaminate the fomites which act a major mode of transport.Thus, the virus readily transported to other premises by people through contaminated shoe and clothing. The virus is shed from the nares, mouth, conjunctiva, and cloacaof infected birds into the environment because of virus replication in the respiratory, intestinal, renal, and/or reproductiveorgans.Transmission between individual birds can occur by inhalation or ingestion.Domesticated birds like chickens, turkeys, etc. may become infected with avian influenza A viruses through direct contact with infected waterfowl or other infected poultry, or through contact with surfaces that have been contaminated with the virus.Low pathogenicity avian influenza viruses are distributed worldwide. It could be present in rural area, village or backyard flocks and other birds sold through live-poultry markets. HPAI viruses also can be detected in epidermis includingfeathers, feather follicles, and glands resulting in environmental contamination. Transmission between interspecies could be possible especially between closely related host species like such as chickens, turkeys, guineafowl, and quail. The other source which could introduce influenza into poultry flock are domestic and confined poultry, migratory waterfowl,other wild birds, domestic pigs,and companion or pet birds.

Clinical sign and symptoms

Clinical sign and symptoms vary with type of influenza virus and depend on otherfactors including host species, age, sex, concurrent infections,acquired immunity, and environmental factors. Low Pathogenicity Avian InfluenzaViruses in

domestic poultry (chickens and turkeys), produce mild clinical signssuch as abnormalities in the respiratory, digestive, urinary, andreproductive organs. The most frequent signs represent infection of the respiratory tract and include mild to severe respiratory signs such as coughing, sneezing, rales, rattles, excessive lacrimation, ocular and nasal discharge and swollen infraorbital sinuses. In layers and breeders, there may beincreased broodiness and decreased egg productionor fertility, ova rupture (evident as yolk in the abdominal cavity) or involution.Some layer and breeder chickens may show acute renal failure and visceral gout (urate deposition). In addition, domestic poultry will exhibit generalized clinical signsincluding huddling, ruffled feathers, listlessness, decreasedactivity, lethargy, decreased feed and water consumption, andoccasionally diarrhoea or sometimes green diarrhoea or green urine.Emaciation has been reported but isinfrequent because AI is an acute, not a chronic disease. Wild birds produce noclinical signs or symptomless but they act as source of infection.Low pathogenic avian influenza virus causes low morbidity and mortality. If birds infected with secondary bacterial or viral infections or aggravated by environmental stress factors along with influenza then it may leads to high death rate.In domestic chickens, turkeys, and related galliformesHigh pathogenic viruses cause severe clinical signs and damage to multiplevisceral organs and cardiovascular and nervous systems without absence of secondary bacterial or environmental stress.Mortality rate is very high in high pathogenic viruses. However, clinical manifestations vary depending on theextent of damage to specific organs and tissues. All clinical signs are not present in all birds.In most cases inchickens and turkeys, somebirds being found dead prior to observation of any clinicalsigns. If the disease is less fulminating and birds survive forthree to seven days, individual birds may exhibit nervous disorders such as tremors of head and neck, inability to stand,torticollis, opisthotonus, and other unusual positions ofhead and appendages. The poultry houses may be unusuallyquiet because of decreased activity and reduction in normalvocalizations of the birds. Listlessness is common as are significant declines in feed and water consumption. Precipitousdrops in egg production occur in breeders and layers withtypical declines including total cessation of egg productionwithin six days. Respiratory signs are less prominent thanwith Low Pathogenic Avian Influenza viruses but can include rales, sneezing, andcoughing, cyanosis and oedema of the head, comb, and wattle.In severely affected birds, greenish diarrhoea is common. Other poultry have similar clinical signs but maylive longer and have evidence of neurologic disorders such asparesis, paralysis, vestibular degradation (torticollis and nystagmus), and general behaviour aberrations. Cornealopacity has been observed in domestic ducks infected viruses. In wild and domestic waterfowl clinical signs are limited.

Diagnosis

Diagnosis of bird flu not only based on clinical sign and symptoms but also vary with type of influenza viruses because not all signs are present in all infected birds. It is also not safe to enter influenza suspected avian flock house and to handle directly infected bird because it is a zoonotic disease and handler may get infected. The typical sings of low pathogenic viruses are cyanosis of comb and wattle, oedema of face, respiratory distress, convulsions, blindness and paralysis and greenish diarrhoea. High pathogenic virus cause sudden high mortality. Entire flock may dead with few days with showing significance signs and symptoms. Nervous signs and cyanosis of comb and wattle are more common in high pathogenic viruses. Diagnosis of influenza also can be done by post- mortem examination for finding of typical lesions. Post-mortem examination should be conduct by legal authority with bearing gloves and mask. The typical lesions of avian influenza are:

- Haemorrhage on epicardial fat, breast muscles and inner surface of sternum.
- Necrotic foci in spleen, liver, kidneys, intestine and pancreas.
- Visceral gout and nephrosis with swollen kidneys.
- Sinusitis with caseous or mucopurulent exudate.
- Caseous exudates in air sacs.
- Petechial haemorrhages on base of proventricular glands.
- Haemorrhage in lymphoid tissue of Peyer's patches and Meckel's diverticulum of the jejunum.
- Severe pulmonary haemorrhage and oedema.

Confirmatory diagnosis can be done by identification of virus in lab and other serological test.

Treatment

Currently there is no practical and specific treatment available for bird flu infections in commercial poultry. Some antiviral drugs experimentally has been shown effected for reducing mortality, but the drug is not approved for foodanimals.

Supportive care and antibiotic treatment have beenemployed to reduce the effects of concurrent bacterial infections. It is better to adopt preventive measure to control this disease.

Control and prevention

Good management practice is most important way to control bird flu. There is no single strategy for control of bird flu. Good management practice accomplished by using following strategies like:

- Education- farmer should have enough knowledge about bird flu and how it spread and its preventive measure.
- Biosecurity and safety- it includes all sanitary measures in poultry house including modifications to the way poultry arereared and sold, movement management, cleaning anddisinfection of equipment and utensils.
- Diagnostic and surveillance- Proper diagnosis is very necessary for any kind of infection. For bird flu diagnosis and surveillance is very necessary because it is highly contagious if farmer will not take timely action the whole flock could be in danger.
- Eliminationof infected poultry- it is very necessary to remove infected birds and proper disposed otherwise infection may be spread to other bird and man.
- Decreasing host susceptibility- Host susceptibility can be decrease by remove stress and proper nourishment.

For controlling the disease first minimised the movement on the poultry farm and between the farm because the virus can come through fomites or aerosols or any other means like by contaminated shoes. Biosecurity is most important measure for controlling of disease. It includes disinfection, cleaning of poultry sheds and restrictions on movement of poultry and items associatedwith poultry. The most important source of virus for poultry is other infectedbirds, so the basic means for the prevention is separation of susceptible

birds from infected birds and their secretions and excretions. Transmission can also occur when susceptible and infected birdsare in close contact or when infectious material from infectedbirds is introduced into the environment of susceptible birds.

Such introductions are associated with the movement of cages, equipment, footwear and clothing, vehicles, insemination equipment, etc. The presence of virus in faecal materialand respiratory secretions is a likely means for movement ofthe virus either by ingestion, contact with mucus membranes, or inhalation. For control of introduction of virus into shed sprinkled lime powder outside of entrance and monthly change bedding material. Equipment that comes in direct contact with birds or theirmanure should not be moved from farm to farm without adequate cleaning and disinfection. Contaminated equipment should clean with 4% KMNO4 and other disinfectant. The speed with which bird flu is controlledis highly dependent upon how fast the first cases are detected, the existing biosecurity, and how quickly control strategies are implemented. Elimination of infected birds also play a key role in spreading of disease. After diagnosis of infected flocks, elimination of infected birds, their eggs, and manure is essential to preventing future transmission. For High Pathogenic avian Influenza, elimination has been typically accomplishedthrough depopulation and disposal of carcasses, eggs, and manure by an environmentally sound method such as composting, incineration, rendering, or landfill burial. Incineration is the best method of decomposition of infected material. It prevents further spread of disease in both birds and humans. In case of low pathogenic avian influenza after recovery from infection birds can be orderly marketing and their egg also after proper cleaning with disinfectant. Recovered birds should not be mix with healthy birds because recovered birds can shed viruses till few week to months. Improve resistance or decreasing susceptibility is also a mean of reduce disease. It could be accomplished by rearing of more resistance breed of poultry. Indigenous birds have high resistant power to low pathogenic influenza viruses. There is no effective vaccine available for avian influenza in market so its better to take care other means of control such as sanitation and biosecurity.

Conclusion

Bird flu is highly infection disease of poultry and it causes heavy mortality. Young birds are highly effected. There is no specific treatment and vaccine available for influenza virus so prevention is main objective to control this disease. The farmer should take preventive measures such as maintain hygiene, restriction of movement between two farms and after outbreak proper disposal of infected birds and contaminated material.

APPLICATION OF ETHNOVETERINARY PRACTICE IN TREATMENT OF MASTITIS IN DAIRY CATTLE

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"To treat four times : the man, the animals, the plants and the soil" - old African saying

Ethnoveterinary medicine is the holistic interdisciplinary study of the local people's knowledge, skills, methods, the socio-cultural structures and environment associated with practices and beliefs about the care of their animalshealthcare and husbandry, which will be produced by the research centre will be generally cost-effective, environment-friendly and sustainable to a specific area. The chemical laboratories tests and research of the traditional formulations and medicinal plants, is expected to be helpful for developing the new veterinary drugs and medicines.Ethnoveterinary knowledge is acquired through practical experience and has traditionally been passed down orally from generation to generation.Widespread interest in documenting and validating ethnoveterinary practices arose in the early 1980s. Since then, several studies have been carried out, many reports documented and numerous conferences, symposia and workshops held. Despite recent efforts to promote the use of ethnoveterinary knowledge worldwide, much information is only docu-mented in field reports and scientific publications.

World Health Organization, at the moment, at least 80% of people in developing countries depend largely on these practices for the control and treatment of various diseases that affect both animals and humans. The importance of aethnoveterinary approach to animal health of current research and future prospects, which hopes to inform and encourage investigations in new directions. Sustainable development requires a concerted effort to combine indigenous knowledge systems with scientific research to improve animal health. This is the case not only in rural areas where access to orthodox veterinary health care may be limited, but also against the backdrop of antibiotic resistance and increased demand for alternative and complementary therapies to enhance the health of both production and companion animals.

Udder and teat health are increasingly important for dairy producers and any disease condition involving udder or teat ultimately affects the productivity and the farmer's economy. Unscientific milking and management practices are the main cause for teat and udder affections and cause a great loss to the poor farmers. The dairy farmers are less aware about clean milk production and teat or udder health. Further, they also do not pay enough attention on udder care and sometimes even mishandle the udder which always leads to teat and udder affections. For successful dairy farming practice also ensures that the milk is produced by healthy animals in a manner that is sustainable and responsible from the animal welfare, milking hygiene, nutrition in term of feed and water, social, economic and environ-mental perspectives. Mastitis is one of the most significant diseases of dairy cattle. Mastitis is an infectious disease condition resulting in an inflammatory reaction in the mammary gland of the cow. It may be accompanied by signs of inflammation in the mammary gland including swelling, redness, and painfulness. As per the texts of Ayurveda, mastitis is known as Sthanavidhradi, a disease of pitta origin, the drugs used in this formulation (Aloe vera, Curcuma longa and Calcium hydroxide) is potent pitta shamaka (Pacifies Pitta humour), other formulation for mastitis are Aloe vera - 250 g; b) Turmeric- 50 g (rhizome or powder); c) Calcium Hydroxide (lime)-15 g; d) Lemon - 2 nos. For udder edemaSesame or mustard oil - 200 ml; Turmeric powder1 handful; Garlic-2 pearls. For teat obstruction freshly plucked & clean neem leafstalk- 1; Turmeric powder; Butter or Ghee is used for the satisfactory results. The formulation possesses Krimighna (antimicrobial), Vranashodaka (wound cleanser), Vranaropaka (wound healing), Shothahara (anti-inflammatory) andSrotoshodaka (channel cleanser) properties. Hence, mastitis can be efficiently managed with this formulation. The antimicrobial activity of Aloe vera is attributed to the anthraquinones (aloin and emodin), flavonoids, tannins (active against MRSA), saponins, p-coumaric acid, ascorbic acid, pyrocatechol and cinnamic acid. Alkaloids, tannins, phenolics, terpenoids, phytosterols, saponins, flavonoids, glycosides, fatty acids such as palmitoleic acid and ?-turmerone in fixed oils of Curcuma longa also possess antimicrobial activity against wide range of bacteria. The anti-inflammatory activity of Aloe vera is reported to be due to Brady kinase which decreases vascular permeability, neutrophil migration, and

leukocyte adhesion and reduces edema formation. It is also found to decrease the production of TNF?, inhibit PGF2? and TB4. Curcumin, the active principle of Curcuma longa is reported to inhibit NF-?B which in turn decreases TNF-?, superoxides, COX-2, iNOS and NO. It inhibits LOX pathway and decreases the formation ofleukotriene. Calcium hydroxide is known to possess anti-inflammatory action and reduces edema formation. Frequent sanitary milking of the affected quarter(s) is also recommended for the prevention of the teat and udder affections. Evidence based on historical use of a treatment is the most widely used criterion to determine whether a treatment is safe and effective or not. In most cases, ethnovets will try to find out how many other cattle

owners use the same treatment: the more users, the higher the credibility of the treatment.

All parts of the plants, including leaves, bark, fruits, flowers, seeds are used in medicinal preparations. At present over 35,000 plants are known to have healing properties. Edible earth and minerals Edible earth, especially from termite and ant hills, is commonly used in ethnovet preparations. Limestone is a commonly used edible type of earth used in decoctions and concoctions. Parts and products of animals, such as skin and hides, bones, milk, butter and even urine and dung are ingredients of ethnovet medicines. Other ingredients include honey, vegetable oils and butters, and salt are used for their healing and preservative properties. Unlike conventional medicines, which are only approved for public use after carefully planned laboratory research followed by field trials on animals both for toxicology and effectiveness, ethnovet medicines depend only on historical evidence of use as proof of safety and effectiveness. Changing environmental factors have in some cases led to some important medicinal plants becoming scarce and to the emergence of new diseases. These developments have led to pressure on ethnovet treatments from time to time. In the face of these challenges, local cattle owners have often used the following criteria to validate the safety and effectiveness of ethnovet medicines.

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SUMMER MANAGEMENT OF BOVINE SKIN DISEASES

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ABSTRACT :

The skin and hair coat condition is used as an indicator of animals general health, as smooth and glossy hair coat reflects healthy body condition. The parasitic, viral, bacterial, nutritional origin diseases frequently affecting bovines now a days due to decreased immunity. Most of the skin diseases in bovines causes animal suffering through annoyance, irritation, pruritus, disfigurement, reduced feed and water intake, decreased production, loss of body weight and secondary bacterial infection. Most commonly observed skin diseases during summer months are discussed.

Key words : Skin diseases, Summer, Photosensitization, Ringworm

INTRODUCTION :

Skin is the major organ of the body and may represent 12-24% of an animal's body weight depending on age and species involved. The skin and hair coat condition is used as an indicator of animals general health, as smooth and glossy hair coat reflects healthy body condition. The parasitic, viral, bacterial, nutritional origin diseases frequently affecting bovines now a days due to decreased immunity. Most of the skin diseases in bovines causes animal suffering through annoyance, irritation, pruritus, disfigurement, reduced feed and water intake, decreased production, loss of body weight and secondary bacterial infection. Most commonly observed skin diseases such as Photosensitization, ringworm, wart during summer months are discussed.

PHOTOSENSITIZATION :

Photosensitization mostly occurs when skin exposed to sun light and lacking significant protective hair, wool, or pigmentation. Due to presence of photodynamic agents in ultraviolet light animals becomes more susceptible to photosensitization.

Classification of photosensitization according to the source of photodynamic agent-

- Primary Photosensitization ((Type I) - Due to presence of photodynamic agents (either ingested, injected, or absorbed through the skin).
- Secondary Photosensitization ((Type II) - secondary to liver damage, resulting in retention of the photosensitizing agent phylloerythrin (a porphyrin), because of impaired hepatobiliary excretion.

Clinical signs :

- Photosensitive animals are photophobic immediately when exposed to sunlight and appear agitated and uncomfortable.
- They may scratch or rub lightly pigmented, exposed areas of skin.
- Mostly affecting the muzzle and non-pigmented skin (ears, eyelids, muzzle).
- The affected skin may ooze serum.
- During the later stages, the affected skin becomes dry and parchment-like and sloughing in final stage.

Diagnosis :

- History and clinical signs.
- Estimation of porphyrin in blood, urine, and feces.

Treatment and control :

- Immediate removal from direct sunlight/pasture and confined in dark shed (cool shaded housing) to prevent further exposure.
- Prevention of ingestion of further toxic material

- Allow to graze only during morning and evening hours.
- The administration of laxatives to eliminate toxic materials already eaten.
- Supportive therapy with systemic antibiotics, topical antibiotic powders and fly control preparations.

DERMATOPHYTOSIS (RINGWORM):

- Dermatophytosis is an infection of skin, hair and nail caused by colonization of dermatophytes on keratinized tissue.
- The colonizing dermatophytes are Trichophyton, Microsporum and Epidermophyton.
- Highly contagious, Zoonotic disease.
- Working bullocks mostly affected.
- Younger and immuno-suppressed animals show higher incidence.
- Transmitted by direct contact with infected animal or Indirectly by contaminated fomites.
- High temperature with humidity, overcrowding, close confinement during summer more predispose to ringworm.

Clinical signs :

- Whitish circular asbestos like lesion on the forehead, around eyes, ear, neck, shoulder and back.
- Mild or intense pruritus, Multifocal alopecia.
- Normal food intake.
- Scaling, Crusting, Hyperpigmentation.
- Follicular papules

Asbestos like crusty lesions around periocular area

Typical ring like lesions on entire body, hyperpigmentation

Diagnosis :

- Direct Microscopic Examination (Trichography)- spores/arthroconidia on surface of infected hair.
- Cultural examination on Sabraouds dextrose agar (SDA) for confirmatory diagnosis.

Treatment and control:

- Clip affected hair, clean area, remove crust.
- Wash or spray- Povidone iodine (1%) / lime sulfur (4%) / chlorhexidine (0.5%).
- Local application of Tincture Iodine or Povidine iodine or white field lotion (Benzoic acid + salicyclic acid) BID for 20 days.
- Individual lesions can be treated with miconazole / clotrimazole lotion BID locally.
- Application of Karanja oil and Neem seed oil locally BID for 20 days.
- Inj. Chlorpheneramine maleate @ 0.5 mg/kg BW IM for 3-5 days.
- Confinement in shed and in area that can easily clean.
- Prevent introduce other/new animal.

- Remove spores from environment.
- Disinfection of shed and premises with household bleach diluted 1:10 in water.

Discrete circular asbestos like lesion on forehead (Before treatment)

Disappearance of lesion with Povidine iodine (After treatment)

PAPILLOMATOSIS (WART):

- Bovine papillomatosis is an infectious, contagious and neoplastic disease, characterized by the presence of multiple benign tumors (papillomas) that can regress spontaneously or progress to malignant neoplasms.
- There are 6 strains of bovine papilloma virus and each has an affinity for different regions on the animal.
- BPV can be transmitted by direct contact, or indirectly by feeders, water tanks, halters, or other equipment or working facilities.
- Most affected age group-6 and 24 months of age.
- It can be exhibited as benign nodular lesions, finger-like projections or cauliflower-like small growths on the skin arising from stratified squamous epithelium that may appear solitary or in multiples.
- Regress as a result of a cell-mediated immune response.

Clinical signs :

- common afftected sites are head, eyelids, ears, neck, dewlap, brisket, shoulders and legs, occasionally on the back, para-genital region and along the lower line of the abdomen.
- Papillomas may also affect the penis, vagina and teats.

Greyish wart lesions on face region

Cauliflower like wart lesion on udder and teat

Treatment :

- Papillomatosis is self limiting and most cases will resolve without treatment in 1-12 months.

- Isolation of affected animal will help prevent the disease from spreading to others.
- Lithium Antimony thiomalate (Anthiomaline)
- Thuja ointment locally bid
- Autogenous vaccine
- Auto-haemotherapy

PARAFILARIOSIS

- The Parafilarial infection is a vector-borne disease of bovines and is characterized externally by focal cutaneous hemorrhagic nodules that ooze out marking dry clotted spots (Bleeding spots) on hair coat.
- Bovine parafilariosis caused by Parafilaria bovicola is prevalent in tropical region generally after rainy season through early summer, where the vector, face flies of genus Musca spp. are abundant.
- Bovine Parafilariosis is of economic importance particularly in beef breeds and can be easily recognized in light coloured animals and was reared in a fly dominant area.
- The draught animals like bullock appears to be more susceptible to Parafilariois.
- The haemorrhagic nodules are commonly found on the neck, shoulder, wither, thoracic area, lateral abdomen and back, which burst out during morning hours with oozing blood and serosanguinous exudates leading to the formation of bleeding sores.
- Clinical examination have presence of swollen nodules on shoulder, neck, dorsal aspect of thorax, and lateral abdomen with clotted bloody exudates dried on haircoat.

Diagnosis and treatment :

- Blood smear examination with Giemsa stain- microfialriae of Parafilaria spp.
- Ivermectin @200µg/kg BW s/c given three days apart, two injections.
- Supportive therapy - anti-inflammatory, antihistaminic and multivitamin preparations.

Control :

- Control of fly.
- Kept animal indoor during summer.

Conclusion :

- The challenges to manage the skin diseases, length of time required for treatment, demands of the owners and regular follow up visits leads clinician a state of frustration to treat skin diseases.
- Provide nutritious feed to enhance immunity, plenty of water, a clean pen protected from dampness and drafts and isolation and treatment of affected animals.

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IMPORTANCE OF CONSERVATION OF INDIAN BREEDS OF LIVESTOCK

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Introduction

As per 19th Livestock Census, India has 190.9 million cattle, which is a major livestock species; represent about 37.3% of total Indian livestock population and 14.7% of total world's cattle population. There are so far 43 registered native cattle breeds in India broadly classified into dairy, draft and dual purpose breed depending upon their utility either in dairying or in agriculture work. The different indigenous breeds of farm animals have adapted to the harsh climatic conditions with low management inputs in terms of feeds, fodder and health care, capable to convert low quality feeds and fodder more efficiently into animal products and better adapted to withstand tropical diseases. They are integral part of agriculture. These breeds are now subject to fast genetic degradation and dilution because of unplanned breeding and introduction of exotic germplasm through cross breeding. As a consequence some indigenous breeds are becoming endangered and there is depletion of good native germplasm which was having unique quality of disease resistance and heat tolerance. The dilution of a breed is in terms of purity of breed. It is a decline in the availability of pure bred animals conforming to the model attributes of the breed and is very common in developing nations. Conservation of genetic diversity is essential to the long term survival of any species, particularly in the light of changing environmental conditions.

The indiscriminate crossbreeding between exotic breeds and indigenous animals has been adjudged as major cause for the losses, as well as the risk to existing breeds. It is believed that continuous import of highly productive animals from developed countries is the most significant threat to domestic animal diversity in the developing world. Therefore, conservation of indigenous animal resources has been projected as a suitable method for slowing down the loss in livestock breed diversity through extinction.

Animals which belong to descript (identified)/ non-descript (non-identified) breeds of indigenous origin are considered as indigenous animals. The breeds which were found in maximum number of states included Sahiwal ,Gir , Hariana , Red Sindhi and Tharparkar.The presence of large population of milch and dual purpose breeds like Gir, Sahiwal, Hariana and Kankrej in many of the states revealed their importance for milk production.

Unique Characteristics of Indian Cattle Breeds

The indigenous breeds of cattle posses various unique characteristics, which makes them well adapted to the tropical climate. The negative impact of environmental heat stress on milk production, fertility, feed intake and growth rate of dairy animals is well known.

The efforts have been made to improve the productivity of the indigenous cattle breeds to meet the country's milk demand by introducing exotic germplasm of superior genetic merit through cross breeding that has resulted in serious erosion for indigenous breeds. Indiscriminate use of this technology has given some negative impacts over the time.

Conservation of Indian Breeds of Livestock

The efforts for conservation of animal genetic resources in India were started with the establishment of National Bureau of Animal Genetic Resources (NBAGR) Karnal in 1984 under the ICAR. The ICAR-NBAGR, Karnal has developed in situ models of conservation through providing technical inputs and incentives to the farmers/ breeders in the breeding tract of respective breed. In situ models were developed for the conservation of Tharparkar and Krishna valley breeds. Bulls of 3 cattle breeds have been selected and trained for semen donation under Ex situ conservation and more than 10000 semen doses from 3 breeds has been conserved. National Animal Gene Bank has been established at NBAGR, Karnal, with the objective of maintaining the indigenous livestock biodiversity of the country. Animal Genomic resources bank has collection of genomic DNA from 130 breeds/ population of livestock and poultry. There is urgent need to consider region and breed specific breeding strategies and programmes to conserve the indigenous breeds. The indigenous cattle breeds should be improved by selective breeding in their native tract. The states having large population of crossbreds, further crossbreeding of local cattle needs to be stopped. Most of the indigenous non-descript low producing cattle are primarily characterized by low input production system across the country, which are deficient in quality feed and fodder resources, basic infrastructure and market facilities etc. Under this production system the non descript cattle can be improved genetically by grading up with bulls of high genetic merit of indigenous cattle such as Gir, Sahiwal, Tharparkar,

Red Sindhi, Rathi, Kankrej etc.

Genetic Improvement Programmes

For strengthening the dairy sector, the Government of India has started various central sector schemes like National Programme for Bovine Breeding and Dairy Development (NPBBDD), National Dairy Plan and Dairy Entrepreneurship Scheme. NPBBDD was launched by merger of four existing schemes including Intensive Dairy Development Pogramme (IDDP) and will have two components namely National Programme for Bovine Breeding (NPBB) and National Programme for Dairy Development (NPDD). The NPBB dedicated for genetic improvement and conservation of indigenous bovine breeds. A total of 33 cattle and 7 buffalo breeds are proposed to be covered under the programme. Similarly 6 cattle breeds- Gir, Kankrej, Rathi, Tharparkar, Sahiwal and Hariana have been covered under National Dairy Plan-1 for implementation of progeny testing and pedigree selection .

National Kamdhenu Breeding Centre for development and conservation of indigenous cattle (43 breeds) and buffalo (13 breeds) being setup with the objective to conserve and preserve indigenous bovine breeds; and to protect threatened bovine breeds from extinction. The core activities include establishment of nucleus herd of indigenous bovine breeds, establishment of semen station and embryo transfer laboratories along with peripheral activities like providing AI and Veterinary facility, fodder production and silage.

National Gokul Mission has been sanctioned in XII plan with an outlay of Rs. 500 Crore with the aim to conserve and develop indigenous breeds in a scientific and focused manner . The objectives of the scheme are to undertake breed improvement program for indigenous cattle breeds so as to improve the genetic makeup and increase the stock; to enhance milk productionand productivity of indigenous bovines; to upgrade non-descript cattle using elite indigenous cattle breeds like Gir, Sahiwal, Rathi, Deoni, Tharparkar, Kankrej and Red Sindhi to distribute disease free bulls of indigenous breeds having high genetic merit for natural service. It is also proposed to establish integrated indigenous cattle centers or Gokul Grams in the breeding tract of indigenous breeds. Fifty Bull Mother Farms having requisite infrastructure for management of animals will be identified in the breeding tract of a particular indigenous breed to provide bulls for natural service.

All India Coordinated Research Project on Cattle, Project Directorate on Cattle (now, ICAR- Central Institute for Research on Cattle, Meerut) has taken up a genetic improvement programme of important cattle breeds in collaboration with various SAUs/ SVUs, State government and NGOs. The objective of the project is to improve the overall performance of the breed through the progeny testing and production of future young male calves using semen of proven bulls for elite mating.

Strategies for Conservation

Three major strategies are normally followed for conservation of farm animal breeds. The first two i.e. in situ conservation as well as ex situ in vivo involves conservation of living population. The third ex situ in vitro (cryopreservation) encompasses conservation of living embryo, ova, semen, somatic cell or other animal tissue, DNA etc. stored cryogenically. In situ conservation of breeds is the most preferred method of conservation, by involving livestock keepers in the production system. One of the most useful aspects of cryopreservation is its supportive role in genetic up-gradation of breeds. Realizing that no clear-cut guidelines are available within present system of management of indigenous breeds in India, the strategy should be to combine genetic improvement and conservation.

CONCLUSION

Although indigenous cattle breeds are best suited to their production system, the financial worth, as a whole, of these native breeds and population is not assessed properly. A National watch list should be prepared for indigenous cattle breeds at risk and those requiring conservation they should be conserved in native habitats by adopting participatory approach by involving breeders, communities, gaushalas, NGOs and other relevant stakeholders in conservation programs. Further, increasing productivity through selective breeding or upgrading would help in averting the declining trends of population of indigenous cattle breeds and their sustainable utility.

EFFECT OF THI ON MILK PRODUCTION IN DAIRY ANIMALS

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Abstract :

Thermal stress is of concern for all livestock production systems and its effects have been studied because of the negative impact on production, health and even mortality. Exposure to high ambient temperature is the major constraint on productivity in hot climatic areas. This article focuses on the effect of temperature and humidity on milk productivity and relates how animal stress affects the productivity of dairy animals.By regularly monitoring the temperature and humidity of the farm particularly during summer season, the farmer can himself make necessary microclimatic alterations depending on the THI range and thereby protect the animals from the adverse effects of heat stress and maintain optimum productivity without incurring any economic loss.

Key words: Thermal stress, season, temperature, Humidity, microclimatic, productivity.

Introduction:

It has been documented that India loses 3.2 million tonnes of milk production at present due to climatic stresses. Buffalo population in India comprises of 109 millionwhich significantlycontribute to Indian GDP with 49% of India's milk production. Although buffaloes have not been considered as seasonal breeders but they do show seasonality in breeding and calving, which reduced milk production ultimately in summer (Himadri, 2007). Milk production is affected by a number of factors like genetic potentiality, age, number of previous lactations, pregnancy, season of calving, calving interval and nutrition status (Bernabucciet al., 2002). Among all the factors, the season of calving is said to have marked effect on total production (Pawaret al., 2012). The increase in environmental temperature decreases the milk production in Murrah buffaloes during summer (Vasanthaet al., 2021). High heat load in lactating buffaloes reduced milk production and has shortened duration of lactation periods (Upadhyayet al., 2007).

Temperature humidity Index (THI) a proven marker of heat stress:

Heat load and intensity of heat stress can be measured by simple indices such as THI. Temperature is not the only factor of environment that markedly affects the intensity of heat stress. The temperature humidity index (THI) measures the combined effects of ambient temperature (AT) and relative humidity (RH) to ascertain the intensity of heat load. The THI is considered to be the best, simplest and most practical index to measure the intensity of heat stress in dairy animals (Grewalet al., 2019). THI not only measures heat stress but also determines the impact of heat stress on animal productivity. THI is negatively correlated with milk production and reproductive traits in animals. Milk production was not affected when THI values are between 35 and 72, while a rise in THI from 72 to 76 resulted in sharp decline in milk production (Johnson, 1963).

Mechanism of THI effect on milk production:

In a work done by Vasanthaet al., (2021) the increase in environmental temperature during summer significantly reduced the milk production in Murrah buffaloes of hot and humid tropics of Andhra Pradesh. Decline in milk yield as a direct result of effect of high environmental temperatures was also reported by Maraiet al., (2009). Lactating buffaloes under heat stress have increased reliance on glucose as a fuel source. Heat-stressed buffaloes seem to change their metabolism to preserve glucose for extra-mammary tissues, at the expense of milk lactose synthesis. Despite having much greater energy content, oxidizing fatty acids generates more metabolic heat (~2 kcal/g or 13 % on an energetic basis) compared to glucose. Heat stressed animal become hypersensitive to insulin, and will reduce or block adipose mobilisation and increase glucose 'burning' in an attempt to minimise metabolic heat production. This diverts glucose from mammary tissue to other body tissues and reduces glucose supply to the mammary gland for lactose production leading to reduced milk yield. This may be the primary mechanism for reduction in milk yield during summer (Baumgardet al., 2006).

Conclusion:

The effect of environment on the health and productivity of the animals is well evidenced in different species of animals. The mean THI was recorded >80 units that significantly affected the milk production of buffaloes in the reports ofVasanthaet al., (2021). It is therefore advisable for the farmers to monitor the temperature and humidity of the farm during summer both in the morning and afternoon by installing a hygrometer. Accordingly necessary microclimatic alterations to mitigate the effects of the higher THI for optimum production and reproduction can be undertaken. Hence, nutritional and summer managemental strategies as published in (https://www.pashudhanpraharee.com/impact-of-heat-stress-on-buffaloes-health-and-production-management-strategies-and-tips-for-farmers-to-optimize-milk-production/) need to be adopted to ameliorate additive effects of summer stress for optimum production and well being of dairy animals.

APPLICATION OF ETHNOVETERINARY PRACTICES AND VETERINARY HOMEOPATHY / VETERINARY AYURVEDA IN TREATMENT OF MASTITIS IN DAIRY ANIMALS

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Abstract

Ethno veterinary practices concern to animal healthcare is as old as the domestication of various livestock species. They comprise belief, knowledge, practices and skills pertaining to healthcare and management of livestock. Ethenoveterinary practices use in treatment of various livestock diseases, due to low cost of manufacturing as well as zero report of resistance in antimicrobial. Mastitis is inflammatory condition of breast it causes huge economic loss to the farmer, it may be acute sub acute and chronic. Plant based products and other veterinary homeopathic medicines are serve as a new foundation for alternative mastitis treatment. Several homeopathic drug and its combination such as Bryonia and UrticaUrens, Belladonna, Sulphur, Phytolacca, CarboVegetabilis and Silicea with herbal extract prepration such as aloe vera, Kelp etc andother ayurvedic treatment use for treatment of various stages of mastitis.

Key Words : Ethenoveterinary, Aloe vera, Kelp, Mastitis, Kelp

Introduction

Now a days antibiotic resistant is a worldwide problem in mastitis as well as in other infection. Therefore, it is necessary to implement an innovative approach towards the emergence of drug-resistant in bacterial infection of mastitis and other infection in current scenario. Ethno veterinary practices concern to animal healthcare is as old as the domestication of various livestock species. They comprise belief, knowledge, practices and skills pertaining to healthcare and livestock management. Its a best practice due to low investment cost and no side effect. Mastitis is inflammatory condition of breast it causes huge economic loss to the farmer in form of productivity as well as market value of animal. Mastitis may be acute, sub-acute and chronic type. Its infection occurs either through injury in teat followed by secondary bacterial infection or through teat canal. As its treatment causes huge economic loss to the farmer so plant based products and other Veterinary homeopathic medicines are serve as a new foundation for alternative mastitis treatment. This is due to low cost of manufacturing as well as zero report of resistance in antimicrobial (Pasca et al., 2017). Recently, many research efforts have been conducted to study the alternative treatment to treat mastitis. Natural products have successfully played centralrole in the discovery of drugs of numerous scopes including veterinary medicine. Natural product either develop synthetically or semi-synthetic process or develop naturally and originated in nature. It comes from plant, animal and as well as microbes' sources. Biological activities of the natural product play as an important tool in discovery of new drug. Natural products are promising therapeutics in treating mastitis and other infection. The development of therapeutic agents from natural products has been chosen in consideration as many multiple factors are discovered. Other than its potential biological activities, inexpensive cost and simple preparation also contribute to the factors of development natural products as alternative approach in curing mastitis (Melander et al., 2020). Discovery of many previous studies of the effectiveness of wide range of natural products have pointed out as a promising role to prevent bacteria resistance in the future (Harjanti et al., 2019). It is also considered as beneficial, safe, low cost material, and shows no harmful effectin humans and animals health.

Treatment Of Mastitis Without Antibiotics

Treatment of mastitis is a challenging process because several etiological factor involve in it, it can be treated either by using veterinary homeopathy or Ayurvedic treatment or through naturopathy, but in naturopathy its treatment is depend on the stage of mastitis, include clay therapy and oxygen therapy.

Veterinary Homeopathy

It was started by Samuel Hahnemann based on the 'like cures like' doctrine with the claim that a substance causing disease symptoms in sick people could cure sick people with similar symptoms. The same concept of diagnosis and treatment applied in animals.

Prevention Of Mastitis In Dairy Cows by using Homeopathic drug

Homeopathic Treatment

Homeopathic treatment not prevent on only single animal but it's a herd prevention. Normally, nosodes (fragments of pathogenic cells) are administered to boost immunity of animals.

The veterinary conducts research on the bacteria causing mastitis in the dairy cows and established the right nosode for the specific herd. The nosode are administered to the herd as per scientific guidelines. In most cases 30 dilutions will be most effective.

Complexes

When mastitis strikes, you need to go beyond the nosodes. Here, a number of homeopathic remedies will be combined to combat the mastitis bacteria. Some of the combinations that have proved to be effective for mammary gland infection include: Bryonia and UrticaUrens, Belladonna; Sulphur, Phytolacca, CarboVegetabilis and Silicea.

Specific Treatment

Specific homeopathic treatment is recommended for symptoms such as edema type, lumpy milk among others. Specific treatment was popular with MacLeod and France's Quiquandon.

Table-1: Remedies By Macleod

Homeopathic Remedy	Symptoms	Dose
Aconitum 6x	Acute mastitis infections. Cases that develop rapidly with exposure to cold dry wind. Relieves anxiety and tension.	6 (1 in every 30 minutes)
Arnica Montana 30c	Mastitis resulting from teat and udder injuries. Presence of blood in secretions.	9 (3 every day)
ApisMellifica 6 c	Edema around the udder. Swollen mammary vein. First calving.	4 (1 in every 3 hours)
Belladonna	Acute postpartum mastitis. Red and hot udder. Severe pain. Hot animal body. Quick and strong pulse.	4 (1 in every hour)
Bryonia Alba 30 c	Swollen hard udder. Mild pain when pressed. Increased lying duration. Chronic cases with fibroids.	4 (1 in every 4 hours)-Acute Shop Related Products 8 (2 times a week for 1 month)-Chronic
BeliaPerennis 6 c	Deep udder injuries. Blood in secretion.	12 (3 doses per day for 4 days)
HeparSulhuris 6 x	Sumer mastitis. Aids in udder cleaning.	4 (1 in every 3 hours)
Ipeca 30 c	Internal bleeding. Pink or bloody milk.	9 (3 per day for 3 days)
Phytolacca 30 c	Chronic and clinical mastitis. Sour coagulated milk. Clots at mid lactation.	9 (3 per day for 3 days)
Silicea 200 c	Summer mastitis. Purulent abscess	8 (2 a week for 4 weeks)
S.S.C 30 c	Clinical and subclinical mastitis. Big lumps and yellowish milk.	9 (3 per day for 3 days)
UrticaUlens 6x	Edema forms plaques in clinical cases.	4 (1 every hour)

Table-2: Homeopathic treatment by Quiquandon forcow mastitis

Remedies	Symptoms
Belladonna	Hot and red mammary gland. Painful to touch. Prostrate animal. High fever.
Bryonia	Acute mastitis. Hot pale and hard gland. Immobility. Relief under high pressure.
PlambumIodanum 5 CH +Conium Maculatum	Chronic mastitis. Marker glandular indurations. Mild pain to the touch. Hypertrophy and atrophy.

Phytolacca and Conium	Hard nodes or quarters. Retro mammary ganglia. Painful when touched. Cracking teats.
Belladonna 5CH + Lachesis 5 CH	Tissue infiltration. Violet mammary gland. Prostrate animal.
Carbolicumacidum 5 CH +Lachesis 5 CH	Gangrenous mastitis
Silicea	Pus secretion
ViperaReddi	Acute inflammation. Edema presence. Gangrenous tendency. Cold quarter. Swollen veins. Severe pain when touched. Quick pulse and weak heart.

Ayurvedic treatment of mastitis

This is the use of plant-derived remedies in the prevention and treatment of diseases. It is a science based medical practice that has proved to be reliable in the treatment of mastitis.

Using Aloe vera

1. Take 100 gms of Aloe vera, 2 spoonfull turmeric powder, One or half lemon and two tea spoonful castor oil mix the all constituent make a paste apply over the udderupto 2 to 3 times in a day. It prevent further spread of mastitis and also act as antinflammatory.
2. 250 gm Aloe vera, 50 gm turmeric powder, 15 gmchuna, one or half lemon mix 150 to 200 ml water apply 5-8 times in a day and give one lemon orally upto three days. If blood comes from milk then use gud and curry leaves paste orally to prevent it. Resulscomeswith in 5 to 7 days.

   Juliette De Bairacli-Levy Method herbs such as wood sage, garlic and teucriumscorodonia are used. The wood sage is very effective on mammary gland treatment.

How The Method Works

- ✓ Confine affected animals in airy quarters
- ✓ Keep animal fast for two days provide only fresh drinking water.
- ✓ Ensure that the animal doesn't feed on bedding material and prevent lying down on cold cement.
- ✓ Administer a single dose of wood sage tea every fasting morning. The tea is prepared by mixing two handfuls of the finely cut herbs, two teaspoons honey and one and a half litre of water.
- ✓ Administer 1 dose of senna-based laxative every fasting night. Prepare this by soaking 20 senna cloves in cold water (half litre) for 6 hours. Add ground ginger (1 teaspoon).
- ✓ After fasting, administer a mixture of warm water (1/2 ltr), milk (2ltr) and molasses (10 tablespoons). Provide wood sage (finely cut) mixed with molasses and bran.
- ✓ At mid-day and evening of the third day, administer a mixture of garlic cloves (6-8) grated in water (1ltr).
- ✓ In the following days, provide softened sweet hay (2/3 gallons) mixed with bran (1kg) and molasses (10table-spoons).
- ✓ Provide two handfuls of Greaniumrobertianum, raspberry leaves or Artemisia atrotanum.
- ✓ If the treatment is successful, the cow's temperature will return to normal and it can be left to graze normally.

Aloe

Aloe is popular for its medicinal value. When it comes to mastitis treatment in dairy cows, aloe is used in udder treatment. It's mainly used when the udder has injuries leading to staphylococcal mastitis. The aloe is applied in its raw form and it works magic.

For effective treatment for mastitis, you will also need to inject the affected quarter with aloe syrup. It is recommended that you use 20-60 cc of aloe in its juice form at least once every day. It's important to note that the teat needs to be sterilized before injecting the aloe. The aloe in its natural form brings all the filth that may aggravate the situation in absence of sterilization. It has anti-inflammatory properties, work as coagulant.

Kelp

Kelp is one of the few plants whose success in treatment for mastitis has scientific backing. Its rather preventive than curative making it even better. It not only contains a high amount of minerals but also has an effect on a wide range of bacteria.

Mastitis Ointment Biodynamic

The kelp ointment is made from marigold flowers and lard. Here is the step by step guide on how to prepare the kelp ointment.

- In your double boiler, melt 2 kilograms of lard
- Add dried marigold flowers (Calendula officinalis) - Two handfuls heat upto thirty minutes
- Filter using cheesecloth.
- Pour in containers and cool.

Oxygen Therapy

Oxygen therapy is also used in animals. In dairy cows, its mainly used in treatment of mastitis. Known as 'the cure for all diseases', oxygen therapy is very essential in treatment of mastitis.

Glyoxilide is found in solid form and is provided in 5 cc ampoules doses. This dose is injected into the dairy cow's shoulder or neck muscles using a hypodermic needle. A single dose/treatment is enough to treat mastitis.

After injection, Glyoxilide provokes reactions in cows that will be seen in 21 day cycles and fade with time. The treatment will be effective for 1-2 years.

Clay Therapy

Clay is known to have therapeutic properties. Due to its high absorbency, it has become popular in dressing cows infected with mastitis. For effective mastitis in cows' treatment, the clay is mixed with olive oil or water. Olive oil proves to be the best option as it gives the mixture an elastic consistency.

When using olive oil, make a point of mixing the oil thoroughly. On the other hand, water needs no mixing. Leave it to sip slowly into the soil. Cover with a cloth and set in the sun. In either process, use a wooden spoon and a non-reactive container.

To increase the therapeutic effect, add 2-3 drops of thyme or pine oil in every two litres of the mixture. The mixture can then be applied gently on the teats and udder.

Conclusion

This traditional formulation is very effective in the cure of mastitis. Ethenoveterinary medicine based natural products and veterinary homeopathy and veterinary ayurvedicmedicines is an effective alternative to synthetic chemicals in treating mastitis in cattle.

APPLICATION OF ETHNOVETERINARY PRACTICES AND VETERINARY HOMEOPATHY/ VETERINARY AYURVEDA IN TREATMENT OF MASTITIS IN DAIRY CATTLE

Abstract

Ethnoveterinary practices are the use of local medicinal plants to prevent, cure or treat various diseases in livestock. It can be considered as traditional knowledge, which is used for the well-being of animals. Mastitis is the most widespread disease among cattle and causes huge economic loss to dairy farmers. Treating mastitis is always a challenge to veterinariansand farmers too. So the use of traditional medicine will help in the effective treatment of bovine mastitis. Homeopathic medicine like belladonna, phytolacca, silicea and ipaeca can be used to treat mastitis. Several ayurvedic medicine and medicinal plants can also be used forthe effective treatment of mastitis in cattle.

Keywords: Ethnoveterinary practice, herbs, homeopathy, livestock.

Introduction

The livestock sector is an important component of a nation's economy in terms of income, employment, equity, and foreign exchange earnings. In India cattle, buffalo, sheep, goat, pig, and poultry are the source of milk, meat, egg, skin and hide etc. Livestock provides livelihood to two-third of the rural community. Therefore livestock diseases are a major threat to sustainable livelihood or rural people. In the current scenario, livestock owners and veterinary practitionersare mainly dependent on allopathic medicine. But the word ethnoveterinary is very ancient in our countryand is a century-old practice. It was started with the domestication of various livestock species. It involves the use of domestic knowledge, belief, practices, and skills about healthcare and the management of livestock. India being a developing country has rich ethnoveterinary knowledge.This practice is mainly based on the use of plant formulations and other locally available cheap ingredients. Livestock raisers and local people with a strong knowledge of veterinary medicine usually follow traditional ways of classifying, diagnosing, preventing, and treating common livestock diseases. The traditional medicines that are commonly used for animal healthcare can cut down costs considerably. Moreover, they are readily available to ordinaryfarmers.

This practice is a very cost-effective and dynamic solution to the poor farmers for whom, fulfilling the basic needsis always a priority.It provides a sustainable, economically viable, and eco-friendly system of animal treatment.Ethnoveterinary medicines can be used as a major alternative to antibiotics usedto promote growth and production performance or for prophylaxis and treatment of various pathogenic organisms. This way it could be of great help to reduce the emergence of multidrug-resistant pathogens or superbugs and to avoid antibiotic residues in food of animal origin, like meat, milk, and egg. The constitutional ingredients of ethnoveterinary medicine are easily and locally available, they are easy to prepare and administer. This practice has covered every area of veterinary specialization and all livestockspecies.The ethnoveterinary practice is very ancient and time-tested, it cannot be effective in an emergency as a collection of ingredients sometimes become a major hurdle. Some remedies are inconvenient to prepare and use. Always experience matters in this practice concerningthe amount of different ingredients to be used to prepare the final one. The doses of these medicines are uncertain and remedies are not standard. The diagnosis is mainly based on symptoms rather than the underlying cause of the disease. Furthermore, ethnomedicines are not fast-acting and potent and less suitable to treat epidemic and endemic infectious diseases. Sometimes, there is a chance of animals getting poisoned by the use of a high amount of poisonous plants. In such cases, knowledge of antidote and correct diagnosis of poisoning could be of great help.

The major constraint in the practice of ethnoveterinary medicine is that the modern youth are not interested in disseminating the knowledge from their parents to the next generation. So there is a need for authentic documentation and widespread advertisement among the society. Ayurvedic, homeopathic and Unani medicine departments should take such initiative to promote this practice. The central government had taken a great initiative in this regard by the establishment of the Ministry of Ayush for human medicine. The field veterinarians will derive the benefits of the traditional recipes for the management of livestock diseases. Modern veterinary practitioners would develop closer linkages with the tribals/farmers, shed their prejudice, and learn some of their well-known methods of diagnosis and control of animal diseasesBut in the field of veterinary practice, there is a need to formulate a body that governs and license the ethnoveterinary practice otherwise this pathy will be lost.

Veterinary homeopathy in the treatment of mastitis in dairy cattle

Mastitis is the most widespread and costly disease in dairy cattle. It can be defined as the inflammation of udder tissue due to physical trauma or microorganism. It is a very complex disease and causes huge economic loss to the farmer in terms of reduction in milk production and treatment cost. Good managemental practice at the farm can reduce the occurrence of the disease.

Homeopathic treatment for mastitis in dairy cattle is not much newer. The following medicine we can use to treat mastitis in dairy cattle

Table 1Homeopathic remedies used by MacLeod to treat mastitis

Homeopathic Remedy	Symptoms	Dose
Belladonna 1 m	For acute postpartum mastitis. Udder is very hot and red, painful to the touch. Animal is hot, and pulse is quick and strong.	1 dose every hour. 4 doses.
Aconitum 6 x	Routine treatment for all acute cases, particularly those that develop rapidly after exposure to cold dry wind. Relieves tension and anxiety.	1 dose every half-hour. 6 doses.
ApisMellifica 6c	Indicated for first calving, heifers with edema of and around the udder. Mammary vein is swollen.	1 dose every 3 hours. 4 doses.
Bryonia Alba 30 c	Indicated for swollen and very hard udders. Pain is less intense when pressed. Animal is often lying down. Especially good for chronic cases with fibrosis.	Acute cases: 1 dose every 4 hours. 4 doses. Chronic cases: 1 dose 2 times a week for one month.
Arnica Montana 30 c	For mastitis resulting from udder injuries. There may then be blood in the secretions.	3 doses per day for 3 days.
BeliaPerennis 6c	As with Arnica, but for deeper injuries (e.g.: neglected milkers).	3 doses per day for 4 days.
Phytolacca 30 c	Useful for clinical and chronic cases. Clinic cases with sour, coagulated milk. Chronic cases with small clots at mid-lactation.	Clinical: 3x/day for 3 days, followed by 1 dose a day for 4 days. Chronic: 1 dose every 3 hours, 4 doses.
UrticaUlens 6x	For clinical cases where edema forms plaques sometimes up to perineum.	1 dose an hour, 4 doses.
S.S.C. 30 c	Mixture of Sulphur, Silica and Carbo Vegetabilis that gives good results with clinical and subclinical cases. Lumps are usually big and yellowish, especially in first squirts of milk.	3 doses a day for 3 days.
HeparSulphuris 6x	Aids suppuration and cleaning of udder in summer mastitis cases (C. pyogenes). 1 or 2 doses in greater dilution after udder is okay.	1 dose every 3 hours, 4 doses.
Silicea 200 c	Also useful for summer mastitis cases with purulent abscess.	2 doses a week for 4 weeks.
Ipeca 30 c	Useful for treating internal bleeding that produces pink or bloody milk.	3 doses a day for 3 days.

Table 2 - Homeopathic remedies used by Quiquandon to treat mastitis (Quiquandon, H. 1982)

Remedies	Symptoms
Belladonna 5 CH	Hot red mammary gland that is painful to the touch, high fever. Prostrate animal.
Lachesis 5 CH + Belladonna 5CH	Violet mammary gland, infiltration of underlying tissue with lateral preference. Prostrate animal.
Lachesis 5 CH + Carbolicumacidum 5 CH	Gangrenous mastitis.
ViperaReddi	Acute inflammation with edema, swollen veins, gangrenous tendency, extremely painful to the touch, quarter may feel cold. Weak heart, small quick pulse.
Conium maculatum + Plumbumiodanum 5 CH	Marked glandular indurations. Chronic mastitis or end of mastitis. Little or no pain to the touch. Hypertrophy followed by atrophy.
Phytolacca alternating with Conium	Hard quarter or nodes inside. Painful to the touch, retromammary ganglia. Cracking around teats.
Bryonia	Acute mastitis with hard gland, hot but pale. Animal immobile. Strong pressure brings relief.
Silicea	To dry the pus.

Some other homeopathic veterinary medicine is also available by brand name

1-Tetasule (Goel Vet Pharma Private Limited)
2-Tetasule fibro (Goel Vet Pharma Private Limited)
3-Tetasule fibro gold kit (Goel Vet Pharma Private Limited)
4-Mastitis (PS Vat Pharma)
5-Mastitis Drop (Dr R P Shukla)

Veterinary Ayurveda in treatment of mastitis in dairy cattle

Following ayurvedic preparation can be used to treat bovine mastitis.
1-Application of root of Citrulluscolocynthis relieves pain.
2-Application of Curcuma longa and Daturametel cures immediately.
3-Heated iron should be dipped in water. Drinking these water cures Stanaroga immediately.
4-Feeding of Shatavari for subbclinical mastitis
5-Application of paste of turmeric powder and drumstick/sahjan (Moringa) leaves on udder
6-Application paste of Haldi powder 50 gmaloevera 2-3 peaves and lime stone 10 gmonudderis very effective
7- Neem oil,seeds, and bark are very effective in mastitis because of its healing and antimicrobial property.

Some ayurvedicmedicine are availablewith brand name

1-Ointment Mastilep
2-Helant Spray (Virbac)
3-Wisprec Spray and Tube (Natural remedies Pvt. Ltd.)
4-Syrup Uraksha (Ayurvet)

The use of herbal and homeopathic medicine reduces the cost of treatment in mastitis.

IMPACT OF HEAT STRESS ON BUFFALOESHEALTH AND PRODUCTION: MANAGEMENT STRATEGIES AND TIPS FOR FARMERS TO OPTIMIZE MILK PRODUCTION

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What is heat stress

Heat stress is a major concern for all livestock production systems owing to its negative impact on health and production. It has been documented that India loses 3.2 million tonnesof milk production at present due to climatic stresses and global warming was further hypothesized to reduce milk production by 15 million tonnes by 2050. The major factors that contribute to heat stress are the ambient temperature (AT) and relative humidity (RH). Heat stress is the inability of the animal to lose heat to the surroundings resulting in accumulated heat load. As the ambient temperature rise above the body temperature the animal gains heat via conduction/convention/radiation resulting in accumulated heat load, while a high RH compromise animal's ability to lose heat to the surroundings. However, animals being homeotherms operate numerous behavioural (shade seeking, orientation of body posture away from sunlight, wallowing, reduced motor activity) and physiological alterations including increased respiratory rate to promoteevaporative heat loss and increased heart rate to deviate blood flow from the centreto the periphery to allow heat loss via skin. Despite of numerous efforts a continuous existence of stressor fails thermoregulatory mechanisms resulting in heat stress. Temperature humidity index (THI) is an equation that takes in to the effect of AT and RH and is used to determine the severity of heat stress. A THI value of 72 was considered to be comfort for animals while a rise in THI is indicative of heat stress.

Why Heat stress is of significance in buffaloes

Buffalo population in India comprises of 109 million which contributes to 50% of India's milk production. Buffalo population contributes to livelihood of small, medium and large scale farmers all over the country. Despite of their high milk production, buffalo population in India is being constantly challenged by heat stress owing to hot and humid equatorial tropical climate and are insufficiently thermo tolerant compared to cattle due to differences in their heat regulating mechanisms such as black skin and less density of sweat glands.Heat stress results indepressed feed intake which is a thermoregulatory mechanism to reduce further heat accumulation, altered hemato-biochemical profile and deviation of energy for thermoregulation i.e less blood and nutrient flow to udder while deviate energy for heat loss mechanisms. These disturbances finally impairs production and reproduction parameters in buffaloes

Effect of heat stress on buffalo milk production

Milk production has been negatively correlated with AT, RH and THI. A unit rise in THI was found to decrease milk production by 0.2 to 0.9 kg while a temperature rise from 20 to 30? C decreased milk production by 9% in Egyptian buffaloes. Similarly, the daily milk yield of Murrah buffaloes decreased from 4.46 to 3.65 kg by 18.2% as the THI increased from 74 to 83 in summer. Moreover, heat stress has profound effect on milk composition, exclusively in high yielding breeds. The metabolic heat produced during lactation results in reduced milk protein, lactose, milk fat, solids-not-fat (SNF), short-chain fatty acids while increasing long chain fatty acids in the milk. Recent reports evidenced a significant decline in milk fat and protein when THI rises above 60.

Effect of heat stress on buffalo reproduction

Heat stress had adverse effects on important economic traits in female buffaloes. THI is positively correlated with important economic traits of buffaloes such as age at first calving, dry period, service period, calving interval, incidence of silent heat, repeat breeding and anestrum while it is negatively correlated with pregnancy rate, conception rate, lactation length, milk yield, protein and fat percentage in milk etc.

Amelioration strategies to mitigate heat stress

Shelter Modification

- As buffaloes are dark and has less density of sweat glands they have more sensitive to heat stress. The preliminary strategy to combat heat stress must be shelter management.
- The animals must be provided with shade from direct sunlight under the trees orwell ventilated permanent housing structures or temporary shade using portable shade cloth which can block radiation upto 50%.
- Painting of upper part of shade with white color and proper construction will help to decrease the heat stress

- Care should also be taken to provide enough space for all the animals to lie down and rest at the same time.
- Supplemental shade should also be provided for young calves.
- Shading reduces the radiant heat load by 30% or more and reduces deaths due to heat stroke.
- Shading of the feed and water also offers production advantage.

ManagementalModifications

- Fans may be provided inside the shed to loseheat via convection.
- Usage of sprinklers during the hotter part of the day or placing water dipped gunny bags on the back of the animalhelps heat loss by convection and conduction.
- The animals should be provided with ample amount of clean drinking water in shade near loafing areas.
- When temperature, humidity and radiant solar heat are extremely high, it is advisable to increase the number of watering stations as the animals cannot travel more distance.
- The animals should not be handled and transported during hotter parts of the day, if necessary early hours are preferable to avoid the stress due to handling and transportation.
- It is advisable to feed concentrates during cooler part of the day and feed green roughages during hotter part of the day.
- High quality green forage should be provided in feed bunks in shaded areas to avoid moisture and vitamin loss due to heat.
- Providing wallowing tanks and allowing animals to wallow during the hotter part of the day helps to lose excess heat from the body.
- Maintaining the livestock in good health and condition resists heat stress to some extent compared to ailing animals.
- Managemental practices like, castration, dipping, shearing etc should be preferably done in early summer or during the early hours of a day.
- To lower body temperature cold water submersion, cold water enemas, ice applications, alcohol rubs can also be done.

Dietary manipulations

- Under heat stress animal usually reduce dry matter intake in order to reduce additional metabolic heat production. Thus dietary manipulations must be made in combination with management practices since feeding of high energy diet during hotter part of the day yields no improvement in dietary intake.
- It is important to provide balanced ration (1/4 concentrates and ¾ roughage) to the animals to get optimum milk production.
- Increase the nutrient density,feeding of high-quality forage low degradable protein and use of supplemental fats in the diet of animals.
- As heat stress induces oxidative stress, supplementation of vitamins A, C, E, and mineral mixture containing essential minerals such as zinc, selenium and chromium reduce the negative effect of heat stress on buffaloes.

As heat stress imposes significant threat to the survival of buffaloes, amelioration strategies must be widely adopted to combat heat stress. These practices stated above, alone or in combination must be adopted to reduce the adverse affects of thermal stress. Thereby the production, reproduction and health status of the animals are maintained and the optimum productivity achieved.

COMMON SKIN PROBLEMS OF HORSES AND THEIR HOMEOPATHIC TREATMENT AT A GLANCE

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Horse is an important animal for various activities like transportation, sports, riding, pharmaceuticals (development of antisera), meat, hide etc. For all these purpose we need a healthy animal with good skin coat. Skin quality of horse may be altered by various pathological conditions. In this article we shall come to know how various skin problems in horses can be treated or mitigated by homeopathy. Common skin problems in equines along with their homeopathic remedy are mentioned below:

Warbles:HypodermaBovis infestation, also known as warbles.This name is applied to the swelling met with on the skin of the horse, from the gad-fly depositing its eggs in the skin; a tumor, often as large as a pigeon's egg, containing grubs and matter, being the result. The back and loins are the favorite places for the fly's operations. There may be several such swellings. The treatment consists in cutting into each tumor, squeezing out its contents, and afterwards applying Sul-phurous acid three or four times a-day. The grubs should be burnt.

Fig. No. 1 Larva of warble fly

Lice : Various species of lice infest the skin of all the domestic animals. Two species of lice can infest horses, Haematopinusasini, the horse bloodsucking louse, and Damaliniaequi, the horse biting louse. Normally, the horse bloodsucking louse is found at the roots of the forelock and mane, around the base of the tail, and on the hairs just above the hoof. Severe itching is set up, to relieve which the animal scratches himself until his skin is tender and sore. Filth and poverty are favorable for the development of lice. There is a peculiar skin disease, named Phthiriasis sometimes met with amongst horses where poultry are kept, from transmigration of a particular louse from the fowl to the horse. The itching is so excessive, that the animal is constantly rubbing himself, stamping the ground, kicking his belly, biting his skin, and altogether in a very sorry plight. In consequence of the scratching, the hair is rubbed off, and the denuded surface is covered with blood, or various kinds of eruption. This louse may visit the groom. The treatment of lousiness consists in burning infected bedding and clothing ; in washing harness and brushes in hot water ; in attending to thorough cleanliness ; and in dressing every part of the hide with olive-oil, or, this failing, with Sulphurous acid. The eruption caused by the lice either disappears of itself after they are killed, or may be readily cured by giving the usual doses of Arsenicum three times a-day.

Fig.No.2 : Lice infestation in a Horse

Scabies : Itch, Mange. The disease bearing these names arises from an insect or mite which burrows in the skin, and induces severe irritation, followed by various eruptions. Itch in the horse, according to the greatest authority, is excited by three species of insects, namely, the Sarcopiesequi, which burrows in the skin ; the Dermatodectesequi, which bites and fastens itself to the skin ; and the Symhiotesequi, which penetrates no further than the superficial layer of the skin. The first closely resembles the Sorcoptes of man, both in its appearance, and in the general features of the eruption to which it gives rise. It can live on man, and excite an eruption, which is identical with that of human itch, and which may disappear spontaneously. Grooms attending "mangy" horses have been known to suffer from horse itch caused by the S. equi. Cattle also are affected by it, but experiments have as yet failed in transmitting it to sheep, dogs, pigs, and cats. The second parasite is the special itch insect of the horse, as, if transmitted to the skin of other animals, it speedily dies. In the horse, it gives rise to itching, loss of hair, and a scurfy condition of the skin. The third is found in clusters especially about the horse's heels; then the animal rubs one leg on the other, stamps with his feet, attempts to bite the part, and crusts of scurf form. It is also peculiar to the horse, and

cannot live on other species. In treatment, the object is to kill the parasites. Homeopathic remedies available are Tea tree oil, Aloe vera, Neem, Clove oil,Cayenne pepper, Turmeric, Zinc etc. are applied over skin.First, wash the whole body thoroughly with soft soap and warm water; then dry the skin. These applications may have to be repeated more than once; but one thorough application is generally sufficient as far as the destruction of the parasites is concerned, and the remaining eruptions usually disappear without any treatment. Sulphur Ointment is another good remedy, washing being used as directed. The whole body should be subjected to these processes at the same time, because if one parasite escapes destruction, others will soon be bred. The bedding should be burnt. The stable furniture and clothing should be thoroughly cleansed with soft soap and hot water.

Fig.No.3 : Scabies symptoms over Neck region

Erythema : This occurs from friction between folds of skin, such as between the thighs, in the armpits, &c. The chafing of harness also causes it. Discharges running over the skin, as urine, may excite it. Hot water, sweating, accumulations of dirt, favor this disease. Another form arises mainly from pressure, as when horses are slung and when saddles and collars gall on the skin of the back and shoulders. Hence the name Saddle-gall is also applied. When the pressure is continued, the skin in the middle of the injured part becomes hard and gristly, and in some cases is separated from the surrounding healthy skin by an ulcerated furrow. This is Sitfast. Cracked Heels also belongs to this class. This very common disease of horses often arises from not properly washing and drying the heels, and especially if the horse be afterwards left in a draughty place. It is very apt to come on in frosty weather when the heels are not thoroughly dried, and also when poor horses are suddenly put on a liberal diet. The symptoms are plain enough. The animal becomes lame. One or more of the heels is found painful, hot, and swollen. The skin cracks and fluid exudes. In bad or neglected cases, deep ulcerations form, and the legs swell. The backs of the knees, and the bend of the hock and pastern joints, sometimes become the seat of slight suppuration.

Treatment : When the disease arises from friction and irritating discharges, the part must be thoroughly cleansed with tepid water and well dried, and then dusted with powdered starch, or fuller's-earth. When the cause is pressure, the saddle or collar should be altered in such a way as to fit better, and Arnica Lotion applied frequently. In sitfast, the hardened skin may have to be cut out, in which case the resulting wound should be dressed with Calendula Lotion; if not, apply Arnica Lotion. For cracked heels, clip the hair close to the skin, foment if there is pain, poultice with bran if there is pain and discharge, and if there is ulceration apply Sulphurous acid night and morning. At the same time, give 10 drops of Arsenicum or of Sulphur three times a-day, and feed on mashes, boiled oats, hay, and carrots. Chapped teats will readily heal after a few applications of Sulphurous acid with a camel's-hair pencil.

Fig.No.4 : Saddle gall

Urticaria, Or nettle-rasli, known as "surfeit," arises from indigestion, over-fatigue, and exposure to wet after a long journey. It is recognized by the sudden appearance of blotches, or elevations of the skin, varying in size from a coin to that of one's hand, on different parts of the body. There is considerable heat of the skin, and itching. In mild cases, the general health is not affected, and the eruption does not continue long; whereas in others, there is some amount of feverishness, and the elevations are prone to reappear at intervals for some time. The treatment consists in giving mashes, but no corn, for a few days, and in giving Aconite, Antimoniumcrudum, RhusTox, or Arsenicum-the first medicine for feverishness ; the second, when the disease is associated with indigestion ; the third, when it is the result of cold ; and the fourth, in obstinate, or relapsing cases.

Fig.No.5: Localised swelling showing Urticaria in a horse

Lichen : Pimply eruptions are very common in horses. On stroking the skin with the point of the fingers, especially over the neck, shoulders, and hind-quarters, a lot of hard, gritty bodies are felt. On scratching one of these pimples with the nail, the top of it may peels off as scurf. These pimples may be as large as a hemp-seed; generally break out in spring; are of long duration and most difficult to cure. There is usually some itching and rubbing. Irritation and disorder of the stomach, drinking cold water

whilst the body is heated and sudden exposure to damp and cold, are the chief causes. In treatment, Nux vomica or Antimoniumcrudum are required when there are symptoms of indigestion. Belladonna is required in those cases of papular eruptions which are attended with heat of skin, some feverishness, and great itching. Arsenicum proves of great service in all papular eruptions. Sulphur, also, is a valuable remedy.If there be reason to believe that parasites are the cause of the eruption and itching, dress with Sulphur Ointment," or Sulphurous acid Lotion, night and morning. Attention must be paid to diet and exercise.

Prurigo : This disease is signalized by small pimples, heat of skin, and particularly by excessive itchiness. The horse rubs his neck, root of the tail, mane, against the wall, edge of the manger, or anything else, until the skin is red raw, and covered with small clots of blood. In some cases, the itching is intolerably severe, and the animal bites and rubs himself furiously. The legs are often mainly affected, and then he rubs one against the other, stamps impatiently, tries to nibble them, etc. Many of these cases depend upon a plethoric condition of the system, the result of over-feeding and want of exercise. Others are connected with the presence of parasites, and others are dependent on an excitation of the nerves distributed to the skin. In this latter case, there may be no primary eruption whatever, and those that arise secondarily are wholly due to rubbing and biting. Treatment is as of Lichen.

Eczema : When fully developed, diseased patches, varying in size and irregularly circular, are observed on different parts of the body. On the surface of these inflamed patches are clusters of small vesicles from which a serous fluid exudes, which presently concretes into scabs, and mats the hair together. In a few days the scabs and hair fall off, leaving the skin bare, inflamed, and moistened with exudation. Thin scales form from the drying of this exudation. There is usually considerable and violent scratching and rubbing from the itchy sensation, in which case the diseased surface is covered with some small clots of blood, the result of slight laceration of the skin. Treatment:The best remedies are the following: Aconite is indicated for febrile symptoms ; itching over the whole body, hot and burning skin ; small reddish colored vesicles, with itching. Mercurius, for an eruption at first vesicular, afterwards pustular, which is sometimes dry and sometimes moist, and which itches worst under the influence of warmth. Arsenicum for burning heat and itching of the skin; scales, which peel off; reddish-colored pustules, which break, and leave the appearance of small, shallow ulcers, with an ichorous discharge; painful blotches.Treated with LycopodiumClavatum 200, 1M and 10M with Natriumsulphuricum 6X within 6 months and with added follow-up of 3 months with no relapse.

Mud fever : Mud fever, also known as scratches or pastern dermatitis, is a group of diseases of horses causing irritation and dermatitis in the lower limbs of horsesalso known as dew poisoning, grease, grease heel, or greasy heel.The chief variety of this class of skin disease occurs in horses, and is called "Grease." It consists of inflammationof the skin at the back surface of the fetlock and heels, followed by the formation of pustules, on the bursting of which there is a copious watery discharge. This is an inherited disease-often "runs in the family." Coarse-bred horses and those with much hair on their legs are more subject to it than well-bred horses, the difference being probably due to better grooming and attention in the one than in the other. Exposure to damp and cold, and dirt, are the exciting causes. One form of grease depends on a specific contagious liquid. A swelling appears in one or more legs, the hind more frequently than the fore; this swelling may extend as high as the knees, or hocks. The skin is hot, red, and painful, and the animal is more or less stiff and lame in his movements. In a short time, clusters of small vesicles arise on the skin at the heels containing a clear fluid, which, if it be specific, has the property, when inoculated on oxen and human beings, of exciting an eruption like that of vaccine matter. If the fluid be not specific, it has no such property. The vesicles subsequently become pustules, which contain water. When these break there is a more or less copious discharge of an offensive character. This discharge wets the hairs together, and dries into scabs. Still later, the skin cracks into deep fissures, from which a watery discharge issues. The leg above the heel is much swollen and painful, and the cracks may extend upwards.The diseased surface, in the most advanced stage, becomes covered with large unhealthy granulations, or "proud flesh," which from their appearance are known as "grapes." In the worst cases, what with the grapy condition of the leg, its considerable increase in size from swelling, the copious and offensive discharge, and the lameness present, the animal is in a sorry plight and not pleasant to look at. In some cases, "canker" of the foot is present as a consequence or complication, and in others of confirmed grease the parasites of the itch disease abound. Treatment: In the treatment of this disease, it is most important to keep the part perfectly clean by washing night and morning with lukewarm water and glycerin or petroleum soap, afterwards drying thoroughly with a soft cloth. If there be much offensive discharge and scabs, poultice with boiled carrots or turnips once or twice until the surface is clean. Mashes, carrots, and green food are useful as a change in the diet, and too much corn should be cut off. Arsenicum 10 drops three times a day, will, aided by the above measures, often arrest the disease in its early stage, or prevent it from going on to the ulcerated and grapy

condition. Sulphurous acid Lotion should be used thrice daily as soon as the skin cracks, and especially if you suspect the presence of the itch parasite.

Fig.No.6: Greasy heal in Horse

Warts : One of the best local applications is strong tincture of Thuja, put on with a camel's-hair pencil night and morning, and steadily persevered with. The best internal remedies are Thuja and Calcareacarhonica-10 drops for horses night and morning. Some require to be cut off.

Fig.No.7 Warts in a Horse

Mallenders and Sallenders(Cob Knee): can be a heartbreaking and tenacious skin issue. It presents as an accumulation of thickened, crusted scale and scabs on the front and hind legs of horses. Mallenders occurs behind the knees on the front leg while Sallenders occurs in front of the hock on the hind legs. A common problem for many horses is a dull coat and flaky dry skin, often caused by medical skin conditions such as parasites, scaly and crusty dermatitis, sweet itch, rain rot, and Onchocerciasis dermatitis. These conditions can lead to hair loss, flakiness, lumps and bumps, and extreme itching. Is the common name for a scurfy or scaly disease (psoriasis) situating on the skin at the back part of the bend of the knee. Sallenders is the same at the front of the bend of the hock. In treatment, after softening the scales with warm water and soap, apply Thuja night and morning, and give Arsenicum or Thuja in 10-drop doses at the same times.

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MANAGEMENT OF MASTITIS WITH APPLICATION OF ETHNOVEVETERINARY AND OTHER THERAPIES IN DAIRY ANIMALS

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Abstract

Mastitis is globally considered the most expensive disease of dairy animals caused by plethora of organisms. Though it is difficult, rather impossible, to eradicate the disease, but the development can be checked by adopting certain prevention techniques like dry cow therapy, phyto therapy, teat sealants, teat dips, cytokines, antioxidant therapy etc. The clinically affected animals should be provided prompt treatment and should be milked at last with proper disposal of milk. The present article describes the techniques that can be adopted to decrease the incidence of mastitis as well to prevent the development of new cases of mastitis.

Key Words : Dairy animals,Ethnoveterinary, Mastits, Therapies

Introduction

Mastitis is an inflammation of mammary gland parenchyma, which is caused by bacteria and its toxins , characterized by physical, chemical and bacteriological changes in the milk and pathological changes in the glandular tissue of the udder. It is the most expensive disease of dairy cattle resulting in the reduction in milk production, losses in milk quality and quantity, losses due to discarded milk, premature culling, treatment costs and labour. The economic losses due to mastitis worldwide have been estimated at $35 billion (Wellenberget al 2002). Despite an appropriate choice of antimicrobial, treatment of mastitis may be unsuccessful. Current treatments of clinical mastitis during lactation are not very successful and cure rates are poor, especially in the case of Staphylococcus aureus mastitis.

Mastitis is caused by a wide spectrum of pathogens and, epidemiologically categorized in to contagious and environmental mastitis. Contagious pathogens are those for which udders of infected cows serve as the major reservoir. They spread from cow to cow, primarily during milking, and tend to result in chronic sub-clinical infections with flare-ups of clinical episodes. Contagious pathogens include: Staphylococcus aureus, Streptococcus agalactiae, Mycoplasma spp. and Corynebacteriumbovis (Radostitset al.,2007). On the other hand, environmental mastitis can be defined broadly as those intra-mammary infections caused by pathogens whose primary reservoir is the environment in which the cow lives (Smith et al.,1985). Environmental pathogens include E. coli, Klebsiella spp., Strept. dysgalactiae and Strept. uberis and the majority of infections caused by these pathogens are clinical and of short duration (Harmon et. al.,1994).

Mastitis is an outcome of an interplay of host, environment and organisms (Kinde et. al., 2015). Response of bacterial invasion of the udder depends upon pathogenicity of the bacterial species involved and competency of the cow's immune system. To develop a suitable prevention protocol it is advisable to study the development of mastitis that will provide avenues where we can target to prevent the development of mastitis.

Development of mastitis

Mastitis is nearly always caused by microorganisms, usually bacteria, that invade the udder, multiply in the milk-producing tissues, and produce toxins that are the immediate cause of injury Shaheenet al (2016).

The udder immune system can be viewed as a three-tiered defense starting with physical barriers and non- specific and specific immune responses. Physical barriers and non-specific immune responses comprise the innate or natural immunity. These immune responses are not antigen specific, nor do they have any memory response. Cell mediated and humoral immune responses comprise active immunity and are antigen specific and have memory.

Physical barriers of the udder are anatomic features of the teat and associated structures that pose a physical blockade to invading bacteria at the teat sphincter, the point of entry. These anatomic features include the teat skin, teat sphincter muscle and keratin plug. The teat end serves as the body's first line of defense against infection. A smooth muscled sphincter, which surrounds the teat canal, functions to keep the teat canal closed, prevent milk from escaping, and prevents bacteria from entering the teat. The cells lining the teat canal produce keratin, a fibrous protein with lipid components (long chain fatty acids) that have bacteriostatic properties. This keratin forms a barrier against bacteria. Teat skin that has abrasions, cracks or is smugged with dirt increases bacteria colonization of the skin greatly increasing bacterial numbers around the teat sphincter and thusly increasing risk of bacterial penetration through the teat duct. Bacteria may be present near the opening of the teat canal, either through dirty and wet conditions at the teat end, through teat end lesions or colonization, on contaminated surfaces of milking units (liners or claws), or cow prep procedures. Following milking the teat duct is dilated, greatly increasing the risk of bacterial penetration. Contraction of the teat sphincter takes time, which is why providing cows fresh feed following milking is promoted. This practice allows time for the teat sphincter to constrict, closing off the teat opening, before cows return to their stalls and have direct contact with the environment. The keratin plug is produced by skin lining the teat duct. Keratin is gummy, has bacteriostatic activity and completely occludes the teat canal. Trauma to the teat renders it more susceptible to bacterial invasion, colonization, and infection because of damage to keratin or mucous membranes lining the teat sinus. The canal of a damaged teat may remain partially open. Conditions which contribute to trauma include: incorrect use of udder washes or cleaning compounds, wet teats, improper mixing or freezing of teat dips, frostbite, failure to prep cows or premilking stimulation for milk ejection, overmilking, and insertion of mastitis tubes or teat cannulae.

An inflammatory response is initiated when bacteria enter the mammary gland and this is the body's second line of defense. The bacteria enter mammary glands of cows through their teat canal, where they colonize, proliferate, and release toxins, damaging the mammary gland cells (Quirk et. al.,2012). These bacteria multiply and produce toxins, enzymes, and cell-wall components which stimulate the production of non-specific immune responses including phagocytic cells (i.e., somatic cells), inflammatory response, complement cascade and lactoferrin. Phagocytic cells of various types are by in far the most important mediator of mastitis infections. All though there are a number of cell types, neutrophils and macrophages account for the majority of phagocytic cells in mastitis infections. Polymorphonuclear neutrophil (PMN) leukocytes and phagocyctes move from bone marrow towards the invading bacteria and are attracted in large numbers by chemical messengers or chemotactic agents from damaged tissues. Masses of PMN may pass between milk producing cells into the lumen of the alveolus, thus increasing the somatic cell count (SCC) as well as damaging secretory cells. Macrophages play multiple roles in coordinating activation of the specific immune response. After engulfing a foreign antigen, macrophages will present these on their cellular surface to stimulate lymphocytes to respond.

Numbers of somatic cells remain in large concentrations after bacteria are eliminated until healing of the gland occurs. Clots formed by the aggregation of leukocytes and blood clotting factors may block small ducts and prevent complete milk removal. Damage to epithelial cells and blockage of small ducts can result in the formation of scar tissue in some cases, with a permanent loss of function of that portion of the gland. In other cases, inflammation may subside, tissue repair may occur, and function may return in that lactation or the subsequent one (Harmon, 1994). Complement proteins also move into the inflamed area and promote phagocytosis and killing of bacteria by neutrophils and macrophages. Lactoferrin is a specialize protein synthesized in the udder that binds iron making it unavailable for bacterial growth, especially coliform bacteria.

Staphylococcus aureus can survive within phagocytic cells or become walled off within mammary tissue, thus evading immune detection and preventing its elimination.

The common reasons for mastitis treatment failure associated with the drug factors are (Erskine et al 2003; Serieyset al 2005) :

Improper antimicrobial selection	Low bio-availability
Short half-life of the drug	Weak passage of drug across the blood-milk
Inadequate local tissue concentration	barrier
Side effects of the drug	High degree of milk and serum protein binding
Other factors that will lead to inactivation of the antimicrobial in vivo or in vitro	Combined use of microbicidal and microbiostatic antimicrobials

In the best case scenario, the bacteria are cleared without subsequent colonization of mammary tissues. Successful bacterial colonization of mammary tissue can result in a wide spectrum of disease outcomes, ranging from subclinical (e.g., no obvious change to udder or milk) to peracute clinical (e.g., severe systemic disease symptoms with dramatic changes to udder and milk secretion) mastitis (NMC, 1996).

Current treatments of clinical mastitis during lactation are not very successful despite an appropriate choice of antimicrobial, treatment of mastitis may be unsuccessful (McKellar 1991). Insufficient contact of the antimicrobial with organisms at the site of infection is a major cause of mastitis treatment failure (Serieyset al 2005). Cure rates are, especially poor in the case of Staphylococcus aureus which is responsible for chronic infections and huge economic losses (Gruetet al 2001). Estimate of microbial cure rate during lactation in case of Staph aureus mastitis is usually between 25 and 50% (Sol et al 2000).

Prevention of Mastitis

Prevention of mastitis aims at strengthening these udder immune systems through proper management, boosting host's immune response and minimizing the number of causative organisms.

Key points to minimize mastitis in dairy cows

- Environment
  - Combined use of microbicidal an
  - Sanitization and udder hygiene
  - Udder hygiene,
  - Environmental hygiene and
  - Sanitization measures for milker's hands or milking machines.
- **Nutrition :** The micronutrients being important for proper immune cell function and protection, deficiencies of these micronutrients can have serious consequences on mammary gland health and thus supplementation could provide great benefit to the control of bovine mastitis (Singh et al., 2003).
  - Balanced ration
  - Antioxidant therapy
- **Prompt treatment**
- **Dry Cow Treatment**
- **Vaccination?**

Prevention strategies can be designed based on pathogenesis of mastitis

- Invasion state
  - Minimise exposure
  - Avoid the animals to sit immediately after calving, approx. 10 min (prevents the contact of microbes to udder).
  - Teat dipping
- **Infection stage**
  - Boosting udder immunity by supplementing different antioxidants
- **Inflammation stage**
  - Provide immediate medical care
  - Animals should be segregated from the rest.

Another way to prevent mastitis is to formulate strategies based on etiology as follows :

Contagious Mastitis : Contagious mastitis can be effectively controlled through a rigorous program of teat dipping and dry cow antibiotic treatment. Teats must be dipped in germicide after each milking (this decreases incidence of the disease). Each quarter must be treated with dry cow antibiotics at end of lactation (this decreases prevalence of the disease). Cows with contagious mastitis should be milked last or a separate milking claw used for the infected cows. Milking claws should be flushed with hot water or germicide after milking infected cows (called back flushing). Individual

cloth/paper towels should be used to wash/dry teats. Milkers should have clean hands and wear latex gloves. New additions to the herd should be cultured and persistently infected cows should be culled. Teat lesions should be minimized (from chapping, frostbite, stepped-on teats, lacerations, or machine damage). Heifers can be given dry cow antibiotic treatment during gestation if S. aureus is a problem in the heifers.

Environmental Mastitis : Environmental pathogens are more difficult to control than the contagious pathogens. Many of these organisms are resistant to germicides in teat dip and antibiotics in dry cow therapy. Identification of the source and removal (bedding, ponds, mud) is the key to control. Udders can be clipped to minimize the amount of manure clinging to the glands. Only clean dry teats should be milked. Teats should be pre-dipped with germicide before milking. Cows should be kept standing after milking (offer them feed). Sterile single-dose infusion products should be used and sterile infusion techniques (alcohol swab) should be used. The milking parlor should be kept clean. The teat dipper should be kept clean; organisms an survive in many germicides.

Must do's

- Proper and regular disposal of excreta
- Disinfection of housing premises
- Sanitization of cow's udders and milker's hands or the milking machines prior to use.
- Prior and post milking teat dips with isopropyl alcohol, chlorhexidine and 1% sodium hypochlorite solution is effective.
- Thumb rule is to milk primiparous cows' first and multiparous cows latter.
- Among these healthy cows are to be milked first and mastitic cows milked at last.
- Hind quarter milking should preferably follow fore quarter milking.

General strategies to be adopted

Dry cow management

Dry cow management is important not only in preparing cows for the next lactation but is a key to prevent many disorders e.g., milk fever, abomasal displacements, retained placenta, uterine infections and clinical mastitis. Cows are most susceptible to new mastitis infections during the first two weeks of the dry period, the two weeks before calving, and the two weeks after calving. Dry cow therapy is 90-93% effective against subclinical Streptococcus agalactiae infections, 70-80% effective against Staphylococcus aureus, and 70-90% effective against environmental streptococci.

The 4 goals of Dry Cow Therapy

1. Cure existing infections at dry off.
   - Reducing the number of cows carrying infections through the dry period not only prevents these flaring up into clinical infections but limits the source of contagious bacteria to other cows in the herd.
2. Prevent new infections at dry off and throughout the dry period.
   - Dry period mastitis is difficult to treat, is costly and time consuming and can have long term effects on the cows' production.
   - Prevention is vital, especially where it is difficult to inspect the cows regularly during the dry period.
3. Protect against mastitis and reduce new infections around the calving period.
   - Mastitis around calving is common. The cow's defences are down around the calving period and there is plenty of exposure to environmental bacteria.
4. Reduce Somatic Cell Count (SCC) and mastitis into the subsequent lactation.
   - Effective DCT will significantly reduce Somatic cell count

Dry cow therapy can be blanket i.e. for all cows drying off or selective i.e. only to cows tested positive for mastitis. While dry treatment is very effective, it must be administered properly, and dry cows must have favorable environmental conditions. If the teat ends are not cleaned properly, there is possibility of injecting very high numbers of bacteria into the udder, which would overwhelm the antibiotic just administered. Unsanitary treatment procedures cause rather than eliminate mastitis.

There is no substitute to proper management of dry cows in mastitis control. If dry cows are exposed to muddy or dirty

conditions, the risk of mastitis will increase. This is especially true at calving time; cows are under much stress during this period. If an udder is exposed to wet, dirty conditions, mastitis will increase.

Teat Sealant

The use of an internal teat sealant is an important part of a dry cow therapy program. The combination of Antibiotic Dry Cow therapy and Teat Sealant provides benefits over Antibiotic Dry Cow therapy use alone through improved prevention of subclinical mastitis and reduced ISCC in the first 60 d of lactation. Teat sealants are inert compounds that physically prevent mastitogens from entering the mammary gland through the teat end, an intervention that mimics the natural defence mechanism of a keratin plug, closing each teat canal at drying-off (Godden et al. 2003).

Teat Dips

Pre and post-milking teat antisepsis is regarded as the single most effective practice for the prevention of mastitis to reduce the new intramammary infection rate in dairy cows and to maintain a low level of mastitis. Chlorhexidine (0.2%), a commercial iodophor (1% available iodine), a hypochlorite (4% available chlorine and Tap water can be used.

Role of nutrition

Nutritional factors play a key role in enhancing resistance against mammary infections (Politis, 2012), and dietary/ ancillary supplementation of micro elements such as, Zinc, Copper, Cobalt, Iron, Manganese, Chromium and Selenium is essentially required for optimization of udder immunity (Scalettiet al., 2003; Politis, 2012). Micronutrients such as Beta-carotene, Vitamin A, C and E, lactoferrins, L-histidine provide enhanced immunity and antioxidative effect, which prevent alveolar tissue degeneration. Protein, vitamin A and zinc influence epithelial health and can impact physical defense barriers of the udder. Protein status will also influence the integrity of the smooth muscle teat sphincter. Quality and quantity of the keratin plug may be influenced by protein, zinc and vitamin A. A meta-analysis revealed that vitamin E supplementation, on average, reduced the risk of intramammary infection 14% and reduced SCC by 70% .Recommended feeding level (as per Nutrient Requirements of Dairy Cattle, 7th rev. ed., National Academy Press: Washington, DC).

- Vitamin E:1000 IU per day to dry cows
- Selenium : 3 mg/d for dry cows
- Copper :10 and 15 ppm of the diet
- Vitamin A: 110 IU/kg BW
- Vitamin D : 30 IU/kg BW for dry cows
- Zinc: 300 mg/day

Phytotherapy

Potential of plants with antibacterial, anti inflammatory, antioxidant and galactagogue effect can be explored. Regassa and Araya (Taddeseet al., 2009) screened some herbal preparation against mastitis causing pathogens and got promising results.

- Common plants are;
- Fenugreek (Trigonellagraecumfoecum),
- Fennel (Foeniculumvulgare),
- Asparagus (Asparagus racemosus),
- Ashwagandha(Withaniasonifera)
- Giloy (Tinosporacordifolia)
- Amla (Embilicaofficinalis)
- Jivanthi(Leptadeniareticulata)

Essential oils

Essential oils are volatile secondary metabolites of low molecular weight derived from plants. These have antibacterial properties, with no reports of resistance after prolonged exposure to gram-positive and gram-negative bacteria, and no side effects on human health which makes them a potential weapon against bacterial diseases. Due to the antibacterial and antifungal characteristics of essential oils and their main components, they are increasingly studied for the control of microorganisms.

Cytokine therapy

Cytokines are low molecular weight regulatory proteins secreted by WBC. Owing to their Immunostimulatory properties, they enhance the immune status of mammary gland. Cytokine regulate the host defence by

1. Activating B cells, T cells, macrophages,
2. Induces clonal expansion of activated B, T cells and macrophages
3. Initiate secondary secretion of variety of other cytokines by activated lymphocytes.

Commonly studied cytokines in mastitis are Granulocyte Monocyte-Colony stimulating factor or Interlukin (IL-2), tumor necrosis factor and Interferons IFN (Sordillo et al. 1997).

Vaccination

Vaccination against mastitis has been tried (Sordillo et al. 1997) but due to the multiple etiological agents involved it is seldom used. Vaccinea are available against Streptococcus uberis , S. agaglactiae , Staph. aureus and E. coli. Vaccines against S. aureus and S. agalactiae contains either the whole organism (cellular lysates, inactive, and attenuated vaccines) or subunits (toxins, surface proteins, and polysaccharides). the mutant core antigen J5 is most commonly used against mastitis due to E. coli.

Prompt treatment

Sub-clinically mastitic cows should be identified and subjected to short term treatment with effective antibiotics at least for 3-5 days. The clinically affected animals should be provided immediate treatment and chronic cases should be segregated or culled. This is the only technique to remove the source of infection. An "extended therapy protocol" or "extended duration of therapy", defined as administering intramammary treatment (mastitis tubes used in the quarter) for 2 to 8 days consecutively increases the chance of complete bacteriological cure of mastitis in which all of the bacteria in the gland causing the infection are killed. Antibiotics have been of value in controlling many infections, but they depend on judicious use to minimize the incidence of resistance forms (Dansoand Vlas , 2002). Complete cure often prevents relapses, prevents further damage to the mammary tissue, lowers somatic cell count, and helps to sustain future milk production.

Conclusion

Mastitis is a multifactorial disease that ensues due to management, host and environmental factors. Incidence of new cases can be reduced by adopting certain management changes as well as by boosting the host defense mechanism as well as udder immunity. Managemental alterations involve adopting dry cow therapy, supplementing antioxidants, providing prompt treatment to affected animals, phytotherapy, cytokine therapy etc.

APPLICATION OF ETHNOVETERINARY PRACTICE AND VETERINARY HOMEOPATHY/ AYURVEDA IN TREATMENT OF MASTITIS IN DAIRY CATTLE

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Introduction :

Mastitis is the one the most commonly encountered economic problem in the milk yield by the dairy farmers. Bovine mastitis, the inlammation of the mammary gland is primarily caused by pathogenic microorganisms, is a major health hazard for the dairy industry. Alternative therapies such as ethnoveterinary medicine are worthy of further study since mastitis-causing bacterial pathogens are becoming increasingly resistant to conventional antibiotic therapy. Plant species were selected on the basis of their known antibacterial activity, use in ethnoveterinary medicine and their ready availability for in vitro testing against a panel of bacterial species implicated in causing mastitis.

Mastitis affects the quality and quantity of milk. Mastitis is a pervasive and costly disease that aflicts mammary glands worldwide. In the dairy industry, a clinical case of bovine mastitis can cost greater than Rs.5,000/- up to Rs.20,000/- in high-yielding cows due to milk yield losses, increased mortality, and treatment costs (Bar et al, 2008; Cha et al, 2011). Mastitis is detrimental to the health of the cow, and its negative effects can impact cow reproduction, milk yield and shelf life of dairy products derived from the cow's milk (Schrick et al, 2001). Ethano veterinary medicines refer to people's belief, knowledge, skill and practice relating to care of their farm (Martin et al, 2001). Aloe vera has been used as an immune stimulant in both humans and animals with no adverse reactions. A review of controlled human clinical trials reported that Aloe vera gel applied topically to a wound site speeds the healing process and when taken orally can lower blood glucose in diabetic patients.(Vogler and Ernst, 1999). The application of Aloe vera based herbal paste for treating the mastitis has been standardized by Directorate of Distance Education, Tamil Nadu University of Veterinary and Animal sciences.

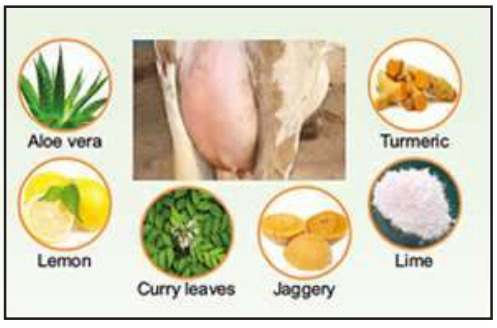
Ethnoveterinary practice in India:

In India mastitis is a major cause of dairy losses. Testing of activity of selected plant extracts has got importance to reduce the indiscriminate use of antibiotics and anti-inflammatory drugs to treat mastitis. Several plant extracts have promising antibacterial efficacy.The mode of treatment can be grouped into two heads A). Mastitis with Anorexia, and B). Mastitis without Anorexia.

1. **Mastitis with Anorexia :**

Ingradients:

a. Aloe vera - 250 g;
b. Turmeric- 50g (rhizome or powder)
c. Calcium Hydroxide (lime)-15 g;
d. Lemon - 2 nos.



Preparation:

1. Blend ingredients (a to c only) to form a reddish paste.
2. Cut both lemons into half.

Application :

1. Make a handful of paste watery by adding 150- 200 ml of water.
2. Wash and clean the udder and apply the mixture throughout.
3. Repeat application 10 times a day for 5 days.
4. Feed 2 lemons twice daily for 3 days.

For blood in milk, in addition to the above, make a paste of curry leaves (2 handfuls) and jaggery and feed orally twice daily till condition resolves.

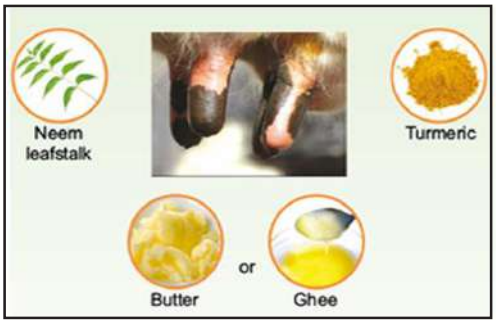
2. Teat obstructions :

Ingredients :

a. Freshly plucked & clean neem leafstalk- 1;

b. Turmeric powder; Butter or Ghee

Coat the turmeric powder & butter/ghee mixture thoroughly on the neem leafstalk.



Application :

1. Insert the coated neem leafstalk into the affected teat in an anti-clockwise direction.
2. Replace with fresh neemstalk after each milking.

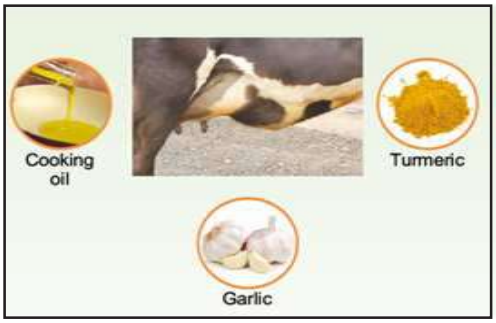
3. Udder Oedema :

Ingredients :

a. Sesame or mustard oil - 200 ml;

b. Turmeric powder1 handful;

c. Garlic-2 pearls.



Preparation :

a. Heat oil, add turmeric powder and sliced garlic.

b. Mix well and remove from flame just as the favour develops (no need to boil).

c. Allow to cool.

Application :

1. Apply in a circular manner with force over the entire oedematous region and udder.
2. Apply 4 times a day for 3 days.

Homeopathic/Ayurvedic treatment of mastitis:

1. Belladonna 30 or 200: When the udder is hot, painful, and edematous.
   Dose : Belladonna 30: one dose every two hours 4 to 5 times tills relief
   Belladonna 200 : B.I.D for 2 days
2. Bryonia 30 or 200: When udder is hard, painful and hot, animal is disinclined to move.
   Dose : One dose every 3 hrs, till relief
3. Urticaria urens 30: When the udder is hard, painful, edematous with allergic
   Reactions and let down problems, dysagalactia,
   Dose : One dose every 1 hr till relief
4. Homeopathic Combination: Belladonna, Bryonia, Urtica AA 30
   Dose : 1 dose once in 2 hrs till temperature comes to normal
5. Phytolocca 200 : When the udder is hot, with flakes and clots in milk and Refuse to allow the calf for suckling or milking
   Dose : 1 dose 2 hourly 4-5 doses, for 2-3 days
6. Conium 200: When the udder is very hard, with yellowish and cheesy milkand painful udder.
   Dose : B.I.D. for 2 - 7 days
7. Merc sol 200 : When the udder is hard and when the milk is watery or Serosanginous in appearance (Foot and Mouth affections)
   Dose: B.I.D. for 2 days

8. Silicea 6x: Udder indurated, milk cheesy in consistence, with yellow clots
   Dose : T.I.D for 1 week to 10 days

B) MASTITIS WITHOUT ANOREXIA :

1. Kali Mur 30: Hardness and White or gray or cream colour clots.
   Dose: 4 time a day for 2 to 5 days
2. Ferrum Phos 6x: Blood in milk with or without bad smell
   Dose : Q.I.D for 2 to 5 days
3. Silicea 1M + Calc. Sulph 200: When udder is hard and with clots
   Dose : Q.I.D for 2 -7 days

1. Agalctia or dysaglactia :

Galatia or Dysaglactia is a condition in which milk secretion is reduced.

Treatment :

1. Correct the cause
2. Good feeding and management
3. Homeopathic Combination 1. :

Alfaalfa	30
Ricinus com	Q
Urtica urens	30

   Dose : 5 to 10 drops T.I.D for 1 week to increase the flow of milk
4. Homeopathic Combination 2. :

Calcarea phos	3x
Calcarea flour	3x
Nat. Mur	3x
Silicea	6x

   Dose : 4 pills of each B.I.D. till improvement
5. Homeopathic Combination 3. : Calcarea Phos ,Ricinus com, Urtica urens, Ferrum phos, Kali phos Nat. phos Mag phos AA 30, AA 3ml
   Made up to 100ml with vimeral liquid, Indications: to increase the flow of milk
   Dose : 2 - 5 ml B.I.D. / 10-15 days

2. Edema and congestion of udder: (Mesothelia)

Congestion of the udder, at parturition is physiological but it may be, at times, cause edema of the abdomen, udder and teats, in high yielders. In most of the cases , the edema disappear with in a day or two of calving but if it continues and persists even after calving, it may interfere with suckling , milking and cause discomfort to the animal to lie down and ruminate.

Treatment :

1. Camphor Q : 5 drops in a cup of water three times a day for one or two days.
2. Apis Mel 200 Nat. Mur 200 Dose: B.I.D. for 1- 2 days
3. Nat sulph 200 Dose: Q.I.D for 2-3 days

3. Udder Impetigo :

This is due to, bacterial infections, caused by Staphylococcal organisms, transmitted through, milker's hands.

Treatment : 1. Calendula officinalis Q Glycerin liquid AA 5 ml
Dose : Apply, on the affected part, 2 times a day, till relief.

2.

Phytolocca	30	1 ml
Calendula	Q	2 ml
Apis Mel	30	1 ml
Belladonna	30	1 ml
Glycerin	liquid	5 ml

Dose : Apply on the affected part

4. Disorders of Teats :

a) Thelitis :

It is the inflammation of the wall of the teat and associated with the traumatic injury to the teat canal. The wall is thickened, hardened and painful and in chronic cases irregular in its internal lining. This inflammation may also results in, due to passing unsterilised teat syphons, catheters and intramammary antibiotics. Not adopting full hand milking.

Treatment :

1. Thiosinaminum 6x : It is good remedy, to dissolve scar tissue, strictures, Adhesions, fibroids.
   Dose : Q.I.D till cure
2. Calcarea Flourica 30: It is an excellent remedy for knots in the teat canal
   Dose : Q.I.D till normalness

b) Sore teats :

It is a very common occurrence in winter. Teats are liable to get infected, excoriated and cracked into painful sores, which may discharge, sanguineous discharge.

Treatment :

1. When the teats are painful, the milk may be siphoned with teat tubes
2. Arnica 30 1 ml
   Calendula Q 2 ml Apply on affected teats,
   Belladonna 30 1 ml
   Glycerin 4 ml
3. Graphites 200 or 1M : When teats are cracked and discharge honey like fluid
   Dose : 1 dose B.I.D / 2 days and apply graphites ointment externally after milking
4. Castor Equi 30: Very effective in cracked and ulcerative teats.
   Dose : 1 dose Bid / 3-7 days.

c) Blood in Milk (Haemogalactorrhea) :

Blood in the milk, is usually due to rupture of blood vessels, in the gland by direct trauma or of capillary bleeding, in a congested udder, soon after calving. Although in the later circumstance, the bleeding, usually ceases with in 2-3 days, but may persist beyond this period and render the milk unfit for human consumption. The discolouration varies from pale pink to dark chocolate brown and may still be present 7-8 days after parturition. Though cow is clinically normal, but on aesthic sense, treatment may have to be resorted to.

The presence of blood stained milk, in all four quarters, at times, other than following post- partum, should be suspected for, bacterial infection, like Leptospira and Streptococci infection.

Treatment :

1. The clots may be broken inside the teat canal by gentle compression and
   Flushed out by gentle milking
2. Arinca 6, Piece 6 and Hamamelis 30: BID/ 2-3 days if the blood is rose in colour. This combination is used 2 weeks after calving. Ravicee injection 5 ml x 2 i/m
3. Bufo rana 30 and Hamamelis 30: BID / 3days in 1st 2 weeks after calving
4. Ferrum phos 6 xs: 10 pill every 4 hrs for 1-7 days.
5. Hamamelis Q + Millefolium Q: 10 drops in cup of water for every 2 hrs.
6. Ravicee injection 5 ml x 2 i/m one injection. This has n-butanol.

Conclusion :

Mastitis is a disease causing significant economic impact throughout the India as well as worldwide amongst commercial dairy farmers, and it also affects the livelihood of rural small-holder farmers. The use of plant extracts and ayurvedic materials to control bacterial infections is important in ethnoveterinary medicine and it is interesting to study such plant species for potential efficacy against bacteria such as those implicated in causing mastitis.Therefore, further research is warranted to isolate and characterize constituents of these extracts responsible for bioactivity.

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APPLICATION OF ETHNOVETERINARY PRACTICES & VETERINARY HOMEOPATHY/ VETERINARY AYURVEDA IN TREATMENT OF MASTITIS IN DAIRY CATTLE

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INTRODUCTION :

Ethnoveterinary practices covers people's knowledge,skill/ method practices and belief about the care of animals and human being(Mc corkle1986). Ethnoveterinary Medicine is the knowledge developed by local livestock holders and incontrast to the Allopathic Veterinary Medicine Taught in Veterinary College /Universities.

Millions of people around the world have an intimate relationship with their livestock. Many people depend on their livestock: animals provide them with food, clothing, labour, fertilizers and cash, and act as a store of wealth and a medium of exchange. Animals are a vital part of culture and in many societies are regarded as equal to humans. To keep animals healthy, traditional healing practices have been applied for centuries and have been passed down orally from generation to generation. Before the introduction of western medicine, all livestock keepers relied on these traditional practices.

ROLE OF ETHNOVETERINARY PRACTICES

Ethno-veterinary Practices: A game changer in reducing antibiotic misuse In Livestock Farmers can help reduce the scourge of antibiotic residues in livestock,especially dairy animals by adopting such practices Antibiotic resistance(AMR) is a worldwide problem created due to the excessive and indiscriminate use of antibiotics in human, animal and plan health. About 90 per cent of the antibiotics used end up in the environment, affecting the quality of water, soils, and biodiversity. AMR makes it harder to eliminate infections from the body as existing drugs become ineffective One of the immediate challenges regarding AMR is to reduce the use of antibiotics both for human and animal health care.As antibiotics find their way through the food chain, there is an urgent need to focus on reducing the use of antibiotics in veterinary practice by working with veterinarians, farmers and dairy cooperatives. Traditional medicines can be used during dry periods to reduce the incidence of mastitis and reduce the retention of placenta. google Ethnoveterinary medicines refer to people's belief, knowledge, skill and practice relating to care of their farm (Martin et al, 2001).

The role of ethno-veterinary medicine in livestock and human health is well known fact due to its widespread practice across the globe, including India. WHO stated that, 80% of people in developing countries depend on ethno-veterinary practices due to its inexpensive, easily available products in field conditions.

VETERINARY AYURVEDA

Ayurveda the eternal science dates back its utility to Mankind. It is perfect material science which help in achieving total health including social, mental, physical and spritiual affluent knowledge in the science and gives pivotal importance to preventive and curative aspects.Ayurveda is a traditional science having a history of 4000 year.

AIMS AND GOALS OF AYURVEDA

Preserving the health, alleviating (reducing) the disease of the diseased animals. The ultimate aim of Ayurveda is to guide every animal to maintain and promote health and prevent ailments.

MASTITISIN DAIRY ANIMALS

It is the inflammation of mammary gland caused by bacteria, virus and fungi and is characterized by physical, chemical and bacteriological changes in the milk by pathologic changes in the milk and glandular tissue. It is a complex disease resulting from interplay between infectious agent and managemental practices and environmental factors. Mastitis is the most common and costlydisease of dairy cattle today and remains one of the majorproblems for the dairy industry.Mastitis is detrimental to the health of the cow, and its negative effects can impact cow reproduction, milk yield and shelf life of dairy products derived from the cow's milk (Schrick et al, 2001).

TYPES OF MASTITIS : Peracute,acute, subacute,subclinical,chronic and chronic granulomatous mastitis and gangrenous mastitis.

ETIOLOGY :

It is caused by bacteria e.g.Streptococcus sp., Staphylococcusand E.colivirus e.g.cow pox and FMD and fungus e.g. aspergillus,candida and cryptococcusand mycoplasma sp., trauma or injury to udder and teat,high milk yield.It may be also due to unhygienic milkers hand incomplete or irregular milking. The bedding used to house cattle is the primary source of environmental pathogens, but contaminated teat dips, intramammary infusions, water used for udder preparation before milking, water ponds or mud holes, skin lesions, teat trauma, and flies have all been incriminated as sources of infection.

PATHOGENESIS :

Invasion, it is the stage at which pathogens move from the teat end to the milk inside the teat canal. Then infection, it is the stage in which pathogens multiply rapidly and invade the mammary tissue then inflammation follows infection and represent the stage at which abnormalities of the udder and marked swelling, increased warmth and gangrene in some cases. (blood)

CLINICAL SIGN :

In acute form of mastitis fever, loss of appetite udder is swollen hot and painful, milk may be yellowish and brownish milk containing flakes and clots and in chronic condition no swelling of udder and get fibrosed,atrophy of udder in milk.There are visible changes on careful examination of milk with reduced milk yield.

PRINCIPLES OF TREATMENT :

A. **Improve enzymatic activity :** Improves the status of metabolism.
B. **Metabolise the end toxin :** Cleanses the toxins of whole animal and udder.
C. **Purifier :** Cleanes the channels of lactiferous glands.
D. **Wound cleanser :** Cleanses the wounds (lactiferous).
E. **Anti-inflammatory :** Pacifies the inflammation due to infection.
F. **Antimicrobial :** Decreases the microbial load.

TREATMENT :

The udder is evacuated and dry cow therapy is also helpful. The udder of the dairy cow requires a non-lactating or rest period, prior to calving in order to optimize milk production in the subsequent lactations. This phase of lactation cycle commonly referred to as dry period. A 45-60 days dry period is recommended.

Use of teat sealant:Because of the growing concern about antibiotic overuse, there is increased interest in the use of intramammary teat sealants. This is a different approach to the prevention of intramammary infections during the dry period The National Mastitis Council's Recommended Mastitis Control Program suggests using a teat sealant on dry cows exposed to a high level of environmental pathogens.

Herbal medicine used in Mastitis

Garlic : powder minced and granulated garlic, it is potent antibiotic

Echinacea : it is a Dry Herb capsules tinctures and extract it boost the immune system. Tea tree oil: it is alternate of antibiotic,

Lavender oil : it is also used in mastitis in dairy cattle

One formulation is for mastitis, the formulation consists of 3 ingredients :

- ☐ Aloe vera L. (Kumari)
- ☐ Curcuma longa L. (Haridra/ haldi)
- ☐ Calcium hydroxide (Chunnam)

Aloe vera L. (Kumari) is a wonder herb, having healing properties from the skin to reproductive. It has the properties of digestive, carminative, cold in potency, anti-microbial, cleanses wounds, anti-inflammatory. (Pandey GS)

Curcuma longa (Haridra) is an herb is used in Indian culinary purpose. It is having the properties of stimulant, blood purifier,anti-inflammatory, antimicrobial(Pandey GS) and Calcium hydroxide is again used along with paan and areca nut. It is having the properties of channel cleanser, anti-inflammatory blood purifier (Nadkarni KM).This formulation consists of Aloe vera, Curcuma longa and Calcium hydroxide which are having the properties of improving enzymatic

activity , metabolise the end toxin , antimicrobial, and anti inflammatory, wound cleanser so this formulation holds good in combating the disease Mastitis.

Application of root of Citrullus colocynthis relieves pain,Application of Curcumalonga in sweet oil or Vaseline can be used as topical ointment cures mastitis. Formulations e.g.Karanjadyaghrutha, Triphalaguggulu and Guggulutikthakaghruth can be used in bovine mastitis as an anti-inflammatory agents.

Bovine mastitis preparations

Ingredient : Aloevera - 250 g; Turmeric powder- 50 g; Calcium Hydroxide (lime)-15 g

Preparation procedure

1. Aloe vera, turmeric and lime were blended to form a reddish paste. 75 g of this paste was taken into a bowl and 150 ml mustard oil was added to make it liquid.
2. Along with this external application, 2 lemon fruits were also fed to the affected cattle after cutting it into halves twice daily for 3 days. For animals with clinical mastitis with blood in milk, in addition to the above, a paste of curry leaves (30 g) and jaggery (100 g) was also feed orally twice daily till condition was resolved.

Application procedure

Udders of the affected cattle were cleaned, washed and milk stripped out completely. Then the mixture was applied thoroughly with firm application of palm pressure. The application was repeated 3 times a day for 3-5 days. The milk yields before and after treatment was also recorded.

MANAGEMENT OF MASTITIS IN DAIRY ANIMALS THROUGH AYURVEDA (in chronic cases)

The treatment prescribed for abscess holds good here also along wound treatment. At the beginning for suppuration, poultice or sudation should not be used. Suppuration should be enhanced by the oral use of appropriate drugs or diet. Once suppuration of this is established, the instrumentation should be done protecting lactiferous ducts, areola, and teats. Repeated milking should be done in all the stages; i.e., inflammation, beginning of suppuration and suppuration of the abscess. Drugs capable of suppressing the bile and cold drugs should be used. Bloodletting with the help of leeches should be done.

Mastitis is compared with Sthanavidhradi as described in Ayurveda as a disease of bile origin. The drugs used in this formulation are potent Pitta shamaka. Hence the disease Mastitis (Sthanavidradhi) can be efficiently managed with this formulation.

This formulation consists of Aloe vera, Curcuma longa and Calcium hydroxide which are having the properties of improving enzymatic activity, metabolise the end toxin, antimicrobial, and anti inflammatory, wound cleanser so this formulation holds good in combating the disease mastitis.

Diet recommended :

Before suppuration : Allium sativum L.- bulbs, Dolichus biflorus L.- seeds, Moringa oleifera Lam. - leaves, Momordica charantia L.- fruit,Boerhavia diffusa L. - entire plant,Plumbago zeylanica L.- root.

After suppuration : old red rice,ghee, oil, soup of green gram,meat soup of wild animals,Musa paradisiaca Kanda,Trichosanthes dioica Roxb. - fruit, Cinnamomum camphora.

CONCLUSION :

Mixture of Aloe vera (200g), turmeric powder (50g) and lime (5g) paste was found to be suitable to treat all type of mastitis without any adverse effects.The conventional Treatment needs ten times higher cost than herbal treatment for treating mastitis. The farmers can use herbal treatment application as preventive strategy to treat the mastitis.

Ethno-veterinary and herbal practices have been in use for centuries, resulting in transfer of knowledge to the common people of the society including the farming sector. The main advantages lie in the facts that they are accessible, easy to prepare and administer, with little cost involved.

An array of herbal plants have been reported which are having immunomodulatory effects like modulation of cytokine secretion, histamine release, immunoglobulin secretion, class switching, cellular co receptor expression, lymphocyte expression, phagocytosis, and so on. The present article deals with wide variety of such plants responsible for safeguarding cattle health from every aspect.

MASTITIS : PREVENTION AND CONTROL

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Mastitis is a multifactoral disease, closely related to the production system and environment where cows are kept in. Itis an inflammatory condition of the udder in which there are changes in the milk colour and consistency. Milk yield reduces abruptly which results in heavy economic losses. It is one of the most devastating diseases on dairy farms. High yielding dairy cows are more commonly affected than low yielders.Exotic and cross bred cows are more prone to mastitis than the Indian zebu cows. Heifers can also be affected by udder infections, even prior to calving.

Approximately 60% of all heifers have an intramammary infection at calving. Some 16% of these heifers will suffer from clinical mastitis during their first lactation and 30% of these mastitis cases will occur within 14 days after calving. This results in a reduced milk yield in the first lactation, causing severe economic losses.

❖ **Causes**

- A large number of species of microorganisms have been implicated as causes of mastitis. They are bacteria, fungus, Mycoplasma and virus.It usually occurs as an immune response to bacterial invasion of the teat canal by variety of bacterial sources present on the farm (commonly through bedding or contaminated teat dips), and can also occur as a result of chemical, mechanical, or thermal injury to the cow's udder.
- The most important bacterial organisms causing mastitis are Staphylococcus aureus; Str. agalactiae; Str. zooepidemicus; Str.faecalis; Str. pyogenes; Klebsiellaspp; Mycobacterium bovis; E.coli.
- The fungal organisms responsible for mastitis are Trichosporonspp; Aspergillusfumigatus; A. midulus; Candida spp.

❖ **Mode of Transmission**

- **Environmental :** The cutaneous surface of the cow may have many organisms as resident population and from where the organisms may invade teat canal and infection reaches the mammary gland. The normal inhabitant of udder and environment like Str. Agalactiae, Stap.aureus and E.coli under favourable conditions multiply and invade the tissues produce much damaging effect.
- **Contamination during handling :** The contamination of milker's hands, clothes and machine cup by milk from the affected quarter may lead to the spread of the disease to other non-infected teats of cow.
- Flies and other insects may also spread the infection from one place to the other.Spread of infection is possible through bedding ground by discharges of affected gland.

❖ **Symptoms**

Clinical symptoms

- Swollen udder with hot, reddened, painful and hard teats.
- Animal will not allow touching the udder and will kick while touching it.
- Milk mixed with blood which give reddish tinge.
- Milk mixed with yellow or brown fluid with flakes or clots and foul smelling.
- Reduced milk yield.

Swollen udder

❖ **Managemental Methods**

- Concrete floor should be avoided and animal should be provided with soft bedding.
- Bedding should be of straw, saw dust or sand.
- Infusion should be used in each cow during dry period.
- Animal sheds should be kept clean.
- Udder and hands of the milker should be washed with antiseptic lotion (4% Potassium permanganate solution) before and after milking.
- Proper cleaning and disinfection of milking machine and the teat cup, vessels should be done after each milking.

- The healthy non-infected cows should be milked first and known infected cows should be milked at last.
- Newly introduced cow should be milked separately and should be screened through California Mastitis Test (CMT).
- Immediately after milking don't allow the animal to lie-down by engaging with fodder.
- The complete milking should be done at every time and milk should not be stored in teats.
- The udder and teats should be protected from any injuries.
- Hygienic measures at milking time, udder preparation before milking, post milking teat disinfections have been recommended as preventive measures.
- Control of fly population should be attempted, for these insecticides fly repellent sprays are to be made in the house and surroundings.
- The frequently affected animals should be removed from the herd.

❖ **Prevention and control**

- Mastitis in heifers can be prevented. In the first place by managerial measures by eliminating the sources of infection.
- Reduce stress on the animals by maintaining proper nutrition, ventilation and housing.
- Maintain teat hygiene which includes good housing management, effective teat preparation and disinfection for good milk hygiene, teat health and disease control.
- Reduce the amount of bacteria in the environment (clean housing and bedding).
- Optimise insect control.
- Remove sucklers from groups of young stock.
- In addition, changes that reduce or eliminate risk factors associated with mastitis should be considered.
- Prompt identification and treatment of clinical mastitis cases should be done including the use of the most appropriate treatment for the symptoms.
- Dry cow management and therapy should be done where cows are dried off abruptly and teats are cleaned before dry cow antibiotics are administered, including the use of teat-end sealants.
- Regular testing and maintenance of the milking machine should be done with regular, recommended teatcup liner replacement and milking machine servicing and attention paid to items which must be checked on a daily, weekly or monthly basis.
- Good record keeping of all aspects of mastitis treatment, dry cow therapy, milking machine servicing, Somatic Cell Count results, and clinical mastitis cases.

Diagnosis and treatment

- Herd screening should be done on routine basis to detect subclinical, clinical mastitis. For this purpose California Mastitis Test(CMT) can be used and then somatic cell count and bacterial culture.
- Other tests like ELISA, bacterial culture and multiplex PCR can be used.

Conclusion

- Mastitis is caused by a variety of bacteria and many of these cases have a high rate of spontaneous cure.
- Many subclinical pathogens are responsive to intramammary treatments using commercially available antibiotic products but there are important cow & herd factors that will influence the cost effectiveness of treatment.
- The decision to treat subclinical mastitis is dependent upon the type of pathogens that are prevalent and diagnostic efforts (milk culturing) must be undertaken before developing a treatment protocol.
- Early detection of mastitis and its careful management is essential for the well-being of a dairy herd.

●❖●

APPLICATION OF ETHNOVETERINARY PRACTICES AND VETERINARY HOMEOPATHY / VETERINARY AYURVEDA IN TREATMENT OF MASTITIS IN DAIRY CATTLE

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Abstract

Bovine mastitis is the inflammation of the mammary gland associated with intramammary infection (IMI) in dairy cattle. Bacteria are the most common etiological agent followed by yeasts or moulds, Prototheca spp. algae and viruses which can cause intramammary infection. Physical trauma or chemical irritation also causemastitis.Mastitis alters the composition and properties of milk, resulting in reduced cheese yields and reduction of shelf life of manufactured dairy products. Treatment costs, veterinary costs and labour costs rise while milking parlour efficiency can decrease due to increased time spent attending to mastitic animals. Thus the application of ethnoveterinary practices and veterinary homeopathy/veterinary ayurveda in treatment of mastitis in dairy cattle is necessary.

Key words - Bovine mastitis, Ethnoveterinary practices, Veterinary Homeopathy, Veterinary Ayurveda

Introduction

Mastitis is an infectious disease condition resulting in an inflammatory reaction in the mammary gland of the cow. It is the most common disease in dairy cattle characterized by various degrees of severity - ranging from a mild disease with no gross changes in the secretion (milk) but an increase in inflammatory cells (somatic cells) in the milk, to a moderate disease with an increase in inflammatory cells and gross changes in the milk. It is accompanied by signs of inflammation in the mammary gland - swelling, redness, and painfulness. Mastitis progresses to a severe disease with above changes in the milk and systemic signs including fever, depression, and "off-feed" and occasionally even death in the most severe cases. Mastitis reduces milk production and milk quality.Economic losses stem from reduced milk production and decreased milk quality. Dairy farmersdiscard milk from cows with clinical cases of mastitis and from cows undergoing antibiotic treatment according to withdrawal periods in order to provide time for antibiotics to clear the cow's body. Apart from economic losses, mastitis is usually painful causing discomfort to cows. Thus, cows diagnosed with clinical mastitis, or those with persistent subclinical mastitis have a greater risk of being culled. Indeed, udder health issues are frequently cited as one of the top three reasons for culling of dairy cows. Low milk productionassociated with mastitis is the leading cause of culling in dairy herds. Toxic mastitis, an acute form of the disease resulting in severe inflammation and septicemia, canlead to cow death. Clinical signs in the form of flakes or clots to purulent exudate, discoloured, watery, or bloody milk, swelling or hardening of the gland and the presence of pain, heat or reddish discolouration of the skin of inflamed glands are prominent. Systemic signs of illness include increased rectal temperature, anorexia, decreased reticulorumen motility, lethargy and death. Severity of clinical mastitis cases can range from mild to severe. The clinical rating depends of the range and severity of the symptoms observed. Although subclinical mastitis is more difficult to identify, monitoring of somatic cell count (SCC) or bacteriological culturing of milk can detect the presence of mastitis.

Types of mastitis in dairy cattle

A. Acute form. In this form, which frequently accompanies parturition, and also, in less severe form, at drying off, the onset is usually sudden, and the condition can be recognised by swelling of the gland and changes in the milk. The swelling takes several forms, ranging from slight edema to hot painful enlargement. Although most often seen as a sequel to calving, this acute form is seen at any time during lactation.

B. Chronic form. In chronic mastitis, feverish manifestations are usually absent, although exacerbations can occur. The gland shows fibrous induration in the region of the milk cistern and the milk itself shows small clots.

C. Mastitis caused by Streptococci. In dairy herds where good hygiene and management are poorly practised, Streptococci shows a morbidity rate of 25%. It is less common in well-managed herds, but can still cause a high loss of production, though rarely resulting in the death of the animal. There is a primary fever which persists for 24 hours, but this systemic reaction is invariably mild, and is associated mainly with Streptococcus agalacticae. Streptococcus dysgalacticae and Streptococcus uberis produce a more acute syndrome with severe swelling of quarters and abnormality of milk. Systemic reaction is usually moderate, although an occasional per-acute infection may yield a very highfever.

D. Mastitis caused by Staphylococci. There is frequently a per-acute form appearing a few days after parturition, and this can be highly fatal, the quarter becoming swollen and purple, and systemic involvement rapid. The chronic form of this type is characterised by a slowly developing induration of udder tissue with watery secretion, leading eventually to atrophy of the quarter. A form in between the per-acute and the chronic yields secretion of a purulent nature containing many thick clots.

E. Mastitis caused by E. coli. Per-acute involvement is fairly common and can lead to loss of function of affected quarters and in many cases to death. The secretion is thin and yellow, and contains small bran-like flakes. Temperature may be very high indicating a severe systemic involvement.

F. Summer Mastitis caused by Corynebacterium pyogenes. Summer mastitis commencesacutely with severe systemic reaction. The quartequarters involved become indurated, yielding a thick cheese-like secretion. Less severe involvement produces apurulent discharge. The udderlater shows abscesses which burst through the outer skin, yielding a creamy pus with occasional sloughing of tissues. The Corynebacteria are well-known for the invasive toxins causing systemicsymptoms.

Strategies to prevent bovine mastitis

1. Hygiene

Since the milking equipment can serve as a fomite (inanimate object which can transfer infection), proper hygiene is essential.

2. Disinfection and dry cow therapy

The use of post-milking disinfectant teat dip and antibiotic dry cow therapy help to reduce the prevalence of contagious mastitis. Environmental pathogens are less likely to be spread during milking. Usage of germicidal pre-milking teat dip prior to milking can further reduce this risk.

3. Management

Various management practices have helped with prevention of bovine mastitis caused by contagious pathogens. Well-managed herds have been successful in limiting contagious mastitis. Control of contagious mastitis is possible and repeatable across herds when implementing these practices. Dip the teats in a germicide after every milking to decrease incidences of the disease. Treat each quarter separately with antibiotics to avoid disease prevalence. Milk infected cows last and use separate milk handling equipment for their products to avoid cross contamination. Use individual disposable towels for cleaning the udders. If you have to use a cloth towel, each cow should have a separate towel. Clean the towel thoroughly with hot water after milking and air dry.The milkers should be clean and preferably wear latex gloves while milking. Isolate new additions into the herd and culture their milk to find out if they have the pathogens that cause mastitis.Cull chronically ill animals. Give your heifers dry-cow antibiotic treatment if you notice that they have Staphyloccocus aureus infection. Clip the udders to reduce dirt dangling around the teats. Pre-dip the teats in a germicide before milking and ensure you only milk clean dry teats.

Keep the cows standing after milking to ensure that their teat canals close to avoid entry by bacteria. You can achieve this by giving the cow some feed.Use single-dose infusions to avoid cross contamination when performing udder cleaning and sterilization.Maintain high levels of hygiene by keeping the milking parlour very clean, using clean milking equipment, and using sterile teat dippers.Clean the pipes regularly to avoid buildup of bacteria. In case of Pseudomonas spp. Invasion, you may be forced to replace the heating and piping systems.

4. Treatment by Ayurveda

The ayurvedic treatment of bovine mastitis includes formulation such as aloe vera, Curcumalonga and calcium hydroxide. The formulation possesses Krimighna (antimicrobial), Vranashodaka (wound cleanser), Vranaropaka (wound healing), Shothahara (anti-inflammatory) and Srotoshodaka (channel cleanser) properties. Thusbovine mastitis can be efficiently managed with this formulation. The antimicrobial activity of aloe vera is attributed to the anthraquinones (aloin and emodin), flavonoids, tannins (active against MRSA), saponins, p-coumaric acid, ascorbic acid, pyrocatechol and cinnamic acid. Alkaloids, tannins, phenolics, terpenoids, phytosterols, saponins, flavonoids, glycosides, fatty acids such as palmitoleic acid and ?-turmerone in fixed oils of Curcuma longa possess antimicrobial activity against wide range of bacteria. The anti-inflammatory activity of aloe vera is reported to be due to brady kinase which decreases vascular permeability, neutrophil migration, and leukocyte adhesion and reduces edema formation. It is also found to decrease the production of TNF?, inhibit PGF2? and TB4. Curcumin, the active

principle of Curcuma longa is reported to inhibit NF-?B which in turn decreases TNF-?, superoxides, COX-2, iNOS and NO. It inhibits LOX pathway and decreases the formation of leukotriene. Calcium hydroxide is known to possess anti-inflammatory action and reduces edema formation. Thus all the three ingredients in the formulation act at various steps in the inflammatory pathway and synergistically produce anti-inflammatory effects. Polysaccharides present in aloe vera are rich in mannose and act as biological response modifier by targeting antigen presenting cell and cytokine cascade. Acemannan increases TNF?, IL-1B, IFN ?, IL-2 and IL-6; aleoride increases NF?B activation and stimulates macrophages which in turn increases nitric oxide production and other cytokines responsible for immunomodulation. Curcumin also possesses immunomodulatory and antioxidant activity. The ingredients are as follows.

1. Gheekumari (Aloe vera) - 2 or 3 petals
2. Haldi (Turmeric) powder - 50gm
3. Chunna (Lime stone) - 10 gm

All the above ingredients are ground well and made in to a paste to be applied over the udder thrice a day for 3-7 days depending upon the disease incidence. Before applying, the udder and teats should be washed with boiled water for 3 times for 5 days. Administration of orally 50 gm of sodium bicarbonate in the juice of lemon dissolved in 200 ml of water is also effective.

5. Homeopathic Treatment

a) Herd treatment Inconsidering prevention we must take account of the various bacteriological causes of the condition, and, if possible, employ the appropriate nosode. By first determining which type of mastitis is present in the herd, we can easily have a nosode or oral vaccine prepared against the organism concerned.For the purpose of herd medication we must employ the nosode in the 30th potency and have it prepared in liquid form. A 5ml vial may be added per month to the main water tank supplying the drinking water. A variation of this approach is to use certain remedies well proven in their relation to the mammary glands, e.g. Phytolacca, and Sulphur, Silicea, and Carbo Vegetabilis used in conjunction. Sub-clinical casesbenefit from this approach.In considering prevention, we must not forget the animals in the herd which are non-lactating during the summer months and consequently are at risk to Corynebacteriumpyogenesinfection - all such animals should be given a monthly dose of nosode, starting in March -heifers in calf for the first time are just as likely to succumb as older animals, and shouldtherefore be included in the prevention programme.

(b) Treatment of individual cases All outbreaks of mastitis call for the employment of various remedies according to the different symptoms, and the animal's reaction to the disease. Among the commoner remedies frequently used are the following :

Belladonna 1m. Indicated usually in the acute form post-partum. The udder shows acute swelling and redness, and pain is obvious on palpation. The animal generally may feel hot with full, bounding pulse. Dose: one every hour for four doses. Aconite 6x. This should be employed as a routine in all acute cases, especially those which develop suddenly, possibly after exposure to cold, dry winds. It will allay tension and restlessness. Dose: one every half-hour for six doses. Apis Mellifica 6c. This is a useful remedy for freshly calved heifers showing oedema of udder and surrounding tissues. The mammary vein is usually engorged in these cases. Dose: one every three hours for four doses. Bryonia Alba 30c. Indicated where the udder swelling is hard and indurated. In acute cases pain will be relieved by pressure on the udder and such cases are frequently presented with the animal lying down as this appears to give relief. Chronic forms showing fibrosis should benefit from this remedy. Dose: in the acute form, one dose four-hourly for four doses. In the chronic form, one dose twice weekly for one month. Arnica Montana 30c. When mastitis has developed as a result of injury to the udder tissue. Blood may be present in the secretion. Dose: one three times daily for three days. Bellis Perennis 6c. Somewhat similar in its requirements to Arnica, but Bellis is probably better if the injuries are more deep than superficial, e.g. damage from teat cups which has gone on for a few days. Dose: one three times daily for four days. Phytolacca 30c. A useful remedy both for acute and chronic cases. Acute forms may show curdled milk and clots, while in the latter, small clots may appear in mid-lactation. This is probably the most useful remedy for the average chronic case.

Dose : for acute cases one three times daily for three days, followed by one daily for four days. Mastitis which appears in the form of small clots in mid-lactation will probably yield to a dose every three hours for four

doses. Urtica Urens 6x. For acute forms showing oedema which may be in the form of plaques frequently extending to the perineal area. Dose: one every hour for four doses. S.S.C. 30c. This is a combination of Sulphur, Silicea and Carbo Veg. and has given excellent results in both acute and sub-acute cases. Clots are usually large and have a yellowish tinge, especially in the fore-milk. Dose: one three times daily for three days. Hepar Sulphuris 6x. This low potency of Hepar will help promote suppuration and clearing of the udder contents in cases of C. Pyogenes or summer mastitis infection.

Dose : one every three hours for four doses. Once the udder has been cleared of purulent material, a dose or two of a higher potency should be given to complete the cure. Silicea 200c. Also useful in chronic cases of Corynebacteriumpyogenes infection where purulentfoci and sinuses have developed as a result of multiple abscesses. Dose: one twice weeklyfor four weeks. In acute cases remedies such as Belladonna, Bryonia and Urtica Urens may be combined as a polyvalent remedy (like S.S.C.). This will avoid the necessity for separate dosing with each remedy. The various nosodes can also be used therapeutically along with indicated remedies, a dose a day for three consecutive days being sufficient. Ipecac 30cis a useful remedy for controlling intra-mammary bleeding which results in 'pink milk', or even more frank bleeding. Dose: one three times daily for three days.

(c) Sub clinical mastitis : Milk can be tested with a pH paper like bromothymol blue in sub clinical mastitis the paper turns to green and in clinical mastitis turns blue. Small quantity of milk is directly boiled in a glass and decanted. In sub clinical mastitis the sediments gets attached to the sides of glass. These two methods are 40% reliable. Use electronic device to know electrical conductivity which is reliable above 95%. All these 3 methods are not useful in colostral period, when the animal has crossed 5th month pregnancy and in a non pregnant animal which has milked for 10 or more months, where milk will be having more sodium and chloride ions in the milk. In such sub clinical case Pulsatilla 30/200, 20 pills TID for 2 or 3 days is used (if used for more days the animal can lose its appetite), Animal can be given two teaspoonfuls (10-12g) of sodium citrate orally once a day, which reduces alkalinity of milk. Sulphur30, Carboveg30, Silicia30, Phytolacca30, Pulsatilla30 each 15 pills TID/QID can be used. In acute mastitis i/mammary and i/muscular treatment is used. Pulsatilla30/ 200, 20-30 pills TID can be used for 3-4 days. Acute mastitis: Echinacea.Q 8drops and Apis Mel CM 6drops in one tea spoonful of water TID/QID. Sulphur30, Carboveg30, Silicia30, Phytolacca30 and Pulsatilla30 each 15 pills TID/ QID. Mastitis in Cattle: Painful swollen udder: Belladonna hourly, Udder Hard but milk not spoiled. Bryonia 200 qid. Hard udder with pus in milk. Phosphorus 200. Udder oedema Natrum Sulph 200 depending on the severity the drug/s may be used 5 to 6 times in a day.

(d) Treatment for Chronic Mastitis :

Use subcutaneously 1/2 ml of injectable Sulphur C2ml of Calcaria Flour-200C in 100 ml of luke warm water is administered orally thrice a day to each animal. Silicea -200C is also administered in same dose and route keeping a time gap of half an hour between two administrations. The treatment is carried out for 20 days.

Treatment : The mode of treatment can be grouped into two heads - mastitis with anorexia and mastitis without anorexia.

A) Mastitis with Anorexia

1. **Belladonna 30 or 200 :** When the udder is hot, painful and edematous.
   Dose : Belladonna 30 : one dose every two hours 4 to 5 times till relief
   Belladonna 200 : B.I.D for 2 days.
2. **Bryonia 30 or 200 :** When udder is hard, painful and hot, animal is disinclined to move.
   Dose : One dose every 3 hrs till relief
3. **Urticaria urens 30 :** When the udder is hard, painful, edematous with allergic reactions and let down problems, dysagalactia,
   Dose : One dose every 1 hour till relief
4. **Homeopathic Combination :** Belladonna
   Bryonia
   Urtica aa 30

Dose: 1 dose once in 2 hrs till temperature comes to normal

5. **Phytolocca 200:** When the udder is hot, with flakes and clots in milk and refuse to allow the calf for suckling or mulking

   Dose : 1 dose 2 hourly 4-5 doses for 2-3 days

6. **Conium 200:** When the udder is very hard, with yellowish and cheesy milk and painful udder.

   Dose : B.I.D. for 2 - 7 days

7. **Merc sol 200:** When the udder is hard and when the milk is watery or serosanginous in appearance (Foot and Mouth affections)

   Dose : B.I.D. for 2 days

8. **Silicea 6x:** Udder indurated, milk cheesy in consistence, with yellow clots

   Dose : T.I.D for 1 week to 10 days

9. **Biochemical Preparation 1:** Kali mur 6x when clots in milk Calc Flur 6x

   Dose : B.I.D. for 1 week to 10 days

10. **Biochemical Preparation 2:** Silicea 6x When the udder is hard Calc Sulph 6x and clots in milk

    Dose : Q.I.D for 1 week

11. **Homeopathic Combination 1:** For intra mammary use.

    Calundula Q
    Belladonna 30
    Dulcamara Q
    Echinaea 30 aa 1 ml
    Made upto 20 ml with distilled water

    Indications : Inflammation of the udder with loss of appetite, fever congestion and trauma.

    Dose : 10 ml Morning and 10ml night, intra mammary injection for 2 to 3 days. Massage the udder to disperse the medicine uniformly

12. **Homeopathic Combination 2:** For External use only

    Phytolocca decandra 30
    Calendula officinalis Q
    Apis mel 30
    Belladonna 30 aa 1 ml
    Made up to 20 ml with glycerine.

    Indications : Indicated in fissures, wounds, ulcers, congestions, hematomas, inflammations, contusions etc.

    Dose : Apply on the affected teats and udder, B.I.D. for 2 - 4 days

13. **Homeopathic Combination 3:** For internal use

    Phytolocca 200
    Calc. Fluor 200
    Silicea 30
    Belladonna 30
    Arnica 30
    Conium 30
    Ipeca 30 aa 0.5 ml.
    Made up to 30 ml vimeral.

Indications : In acute, subacute and chronic mastitis .

Dose : 2 -5 ml, B.I.D. orally for One week.

B) Mastitis Without Anoexia

1. **Kali Mur 30 :** Hardness and White or gray or cream colour clots.
   Dose : 4 time a day for 2 to 5 days
2. **Ferrum Phos 6x :** Blood in milk with or without bad smell
   Dose : Q.I.D for 2 to 5 days
3. **Silicea 1M + Calc. Sulph 200:** When udder is hard and with clots
   Dose : Q.I.D for 2 -7 days.

6. Intrammamary infusions

The teat must be cleaned and disinfect with ethanol, after which it is allowed to dry for a few seconds. Partially insert the cannula containing the infusion onto the teats to reduce contact, which can introduce fungi that will cause a different form mastitis.Once the teat comes into contact with the antibiotic infusion, streak the teats by pinching and palpate a little bit to make sure that the antibiotic treatment enters the mammary gland.

7. Oxytocin treatment

Effective treatment of mastitic cows depends on complete removal of milk from the teat cisterns. It can be achieved by increasing the intervals of milking.Bacteria thrives in milk because it gets nourishment from the milk. When the teat canal is emptied, the bacteria does not find nourishment and the antibacterial drugs will be more effective.If the cow is a high producer, one may need to streak it in between the milking times. The cows can be injected with oxytocin to increase milk let down so that complete milking can be achieved.In some instances, the bacteria may fail to go away despite regular streaking and application of the antibacterial drugs. This will lead to chronic infections, which is associated with Staphyloccocus aureus, bacteria that naturally exist on the skin.In such cases, the cow will remain a constant source of contamination for the rest of the herd. You will have no option but to cull such a cow if you must protect the herd.

8. Vaccines

Vaccines have been designed to combat mastitis, but many are of limited protection against coliform infections. Studies have shown that the J5 core antigen vaccine is efficacious in reducing the incidence of clinical mastitis caused by E. coli, especially during early lactation, but did not reduce the prevalence of infection. Vaccines can be valuable in reducing the duration and severity bovine mastitis.

9. Mycotoxin risk management

Feed should be monitored for the presence of mycotoxins and an effective mycotoxin counteracting productor toxin binder should be incorporated into the feed. Mycofix® contains an aflatoxin binderfor aflatoxin deactivation.

Conclusion

First aid of mastitis involves applying ice cubes on the udder surface. The infected milk from infested teat should be drained out thrice a day and safely disposed. A composition of 5% phenol can be included to the infected milk to ensure hygienic disposal.While milking the herd, strict attention must be paid to first milking healthy, non-infected cows and subsequently those infected.The infected and non-responsive quarter should be dried up, permanently. Calves should be prevented from suckling on the infected teat. The economic losses on the dairy industry involving BM causative agents, the rapid emergence and exhibition of multi-drug resistance as well as their great tendency to cause persistent, chronic and recurrent infections, make this disease a continuous challenge and a subject of investigation by several research groups justifying the continued attention in this area. Independently from the origin of the infection, biofilms have been shown to be important in pathogenicity and therefore may play a role in the biology of recurrent infections, antimicrobial agents/host immune defence system resistance, being consequently more difficult to control/eradicate the disease. The role of ethnoveterinary practices and veterinary homeopathy/veterinary ayurveda in mastitis infections is crucial to determine and study the best control strategies to be used in veterinary practice in order to reduce losses in the dairy industry and to ensure milk safety and quality.

IMPACT OF CLIMATE CHANGE ON LIVESTOCK FARMING

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Abstract

Global demand for livestock products is expected to double by 2050, mainly due to improvement in the worldwide standard of living. Climate change impacts livestock directly (for example through heat stress and increased morbidity and mortality) and indirectly (for example through quality and availability of feed and forages and animal diseases). Climate change is a threat to livestock production through competition for natural resources, quantity and quality of feeds, livestock diseases, heat stress and biodiversity loss while the demand for livestock products is expected to increase by 100% by mid of the 21st century. Livestock sector contributes 14.5% of global greenhouse gas (GHG) emissions, driving further climate change. Consequently, the livestock sector will be a key player in the mitigation of GHG emissions and improving global food security.

Introduction

Human population is expected to increase from 7.2 to 9.6 billion by 2050. This represents a population increase of 33%, but as the global standard of living increases, demand for agricultural products will increase by about 70% in the same period (FAO, 2009a). Meanwhile, total global cultivated land area has not changed since 1991 reflecting increased productivity and intensification efforts. Livestock products are an important agricultural commodity for global food security because they provide 17% of global kilocalorie consumption and 33% of global protein consumption. The livestock sector contributes to the livelihoods of one billion of the poorest population in the world and employs close to 1.1 billion people. There is a growing demand for livestock products, and its rapid growth in developing countries has been deemed the ''livestock revolution". Worldwide milk production is expected to increase 1077 million tonnes and meat production 455 million tonnes in 2050. (Alexandratos and Bruinsma, 2012). Livestock production is likely to be adversely affected by climate change, competition for land and water, and food security at a time when it is most needed (Thornton, 2010). Global climate change is primarily caused by greenhouse gas (GHG) emissions that result in warming of the atmosphere. The livestock sector contributes 14.5% of global GHG emissions (Gerber et al., 2013), and thus may increase land degradation, air and water pollution, and declines in biodiversity (Bellarby et al., 2013)

Green House Gas Emissions

Livestock supply chains are a significant source of global greenhouse gas (GHG) emissions, GHG emissions of the livestock sector are mainly comprised of methane (CH4) nitrous oxide (N2O) and carbon dioxide (CO2). Methane contributes the most to anthropogenic GHG emissions (44%), followed by nitrous oxide (29%) and carbon dioxide (27%). Enteric fermentation, a natural part of the digestive process for many ruminant animals, accounts for 39% of livestock sector emissions. Other significant sources of emissions are feed production and processing (45%) and manure storage (10%). The remaining 6% of GHG emissions is attributable to the processing and transport of livestock products (Gerber et al. 2013). Higher concentrations of these gases, can be explained by lower efficiency and productivity of livestock system due to excess loss of nutrients, energy, and organic matter (Gerber et al., 2013).

Green House gas emissions from livestock production contribute more GHG to the atmosphere than the entire global transportation sector. The livestock sector contributes directly and indirectly to GHG emissions, including through animal physiology, animal housing, manure storage, manure treatments, land application, and chemical fertilizers. Direct emissions from animal sources include enteric fermentation, respiration, and excretions. Indirect emissions refers to emissions derived from feed crops, manure application, farm operations, livestock products processing, transportation, and land use allocation for livestock production (e.g. deforestation, desertification, carbon released from cultivated soils). In the livestock sector, indirect emissions play a greater role in the release of carbon to the atmosphere than direct emissions. However, contribution to GHG emissions varies depending on the type of farming system and region. Deforestation, cultivated soils, and land degradation due to livestock production are the main source of CO2 emissions. From total livestock GHG emissions, 9.2% is attributed to land use change, where 6% is due to pasture expansion and 3.2% is due to feed crop expansion.

Livestock contributes 44% of the world's anthropogenic methane emissions through their normal digestive processes (enteric fermentation) and manure management. During the animals' digestive process, enteric fermentation converts the feed consumed into digestible feed. Enteric fermentation releases a CH4 by-product through exhalation. Livestock manure releases methane and nitrous oxide gas. The decomposition of the organic materials found in manure under anaerobic conditions releases methane. Fertilizer use, agricultural nitrogen fixation, and atmospheric nitrogen deposition generally increase nitrous oxide emissions.

Livestock influence climate through land use change, feed production, animal production, manure, and processing and transport. Feed production and manure emit carbon dioxide, nitrous oxide and methane which consequently affects climate change. Climate change will affect livestock production through competition for natural resources, quantity and quality of feeds, livestock diseases, heat stress and biodiversity loss while the demand for livestock products is expected to increase by 100% by mid of the 21st century Therefore, the challenge is to maintain a balance between productivity, household food security, and environmental preservation (Wright et al., 2012).

Higher temperatures are much more hazardous for growing and breeding animals than a cold environment. Temperatures exceeding the higher critical level compromise animal performance not only by changing the energy and nutrient metabolism, but also by upsetting the body homeostasis, with detrimental consequences both for immunocompetence and for product quality. In general, livestock with high production potential are at greatest risk of heat stress, Climate-Smart Livestock

Climate-smart livestock (CSL) solutions can contribute to a reduction of GHG emissions through improved livestock productivity, efficient use of natural resources, carbon sequestration and integration of livestock into the circular bio economy.

Climate Smart Livestock implemented at farm level by considering three objectives

1. Sustainably increasing productivity;
2. Adapting to climate change; and
3. Reducing GHG emissions

Good livestock practices that improve productive efficiency, reduce GHG emissions and adapt livestock systems to climate change. Enteric fermentation is the main source of direct GHC emissions, thus it is recommended to continue implementing practices aimed to improve the feed basket. Increasing the concentrate (high energy feeds containing cereal grains and oil meals) proportion in the animal diet can reduce methane emissions from the animal. Improving feed digestibility and energy content and better matching protein supply to animal requirements can be achieved through better grazing land management, improved pasture species, changing forage mix and greater use of feed supplements to achieve a balanced diet, including crop by-products and processing of crop residues. These measures can improve nutrient uptake, increase animal productivity and fertility and thus lower emissions per unit of product.

Climate-smart livestock focusing on the efficient use of natural resources include higher yields per hectare, higher water productivity, efficient use of low carbon energy, and the reduction of waste along the value chain.

Conclusion

Well-managed mixed crop-livestock systems reduce GHG emissions. The climate-smart farms increased milk production while reducing GHG emissions and increasing carbon stocks. Higher-quality feed with higher digestibility, protein and energy content produced less methane per unit of animal product. A further option for the future is the use of methane inhibitors, which appear to be successful, but would need to be tested in the tropics. Leguminous forages produce high-quality feed and reduce methane emissions, because they contain more condensed tannins which increase the absorption of essential.

SOME FUTURE PROSPECTIVE FOR INDIAN GOAT ENTREPRENEUR'S

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With the growing human population, it is becoming more and more challenging to provide food at the same pace. It is expected that by 2050's the population is going to be around 9.6 billion (UN, 2013). Currently animal husbandry and agriculture combined, provides employment to more than 1.3 billion humans and the demand for animal origin products, whether, meat, milk, eggs etc is going to be exponentially high by the mid to end of 21st century (Rojas-Downing et al., 2017). On one hand we need to increase the production on the other, this has to be achieved with the climate change and global warming conditions. Many government agencies have predicted a global rise in earth's ambient temperature by the end of this century, with temperature increase between 0.5 to 4.5 C (IPCC, 2018).

Already, the economic losses associated with heat stress are huge all over the world and different mathematical models have predicted future decline in animal production with temperature increase and concomitant economic losses. The impact of heat stress is more evident on large ruminants as compared to smaller ones like goat and sheep. The association between humans and goats is some 11000 years old and it is one of the earliest reared ruminant species by man. Goats provide us with high quality meat, milk, hides, dung, hairs, fibre etc. Native breeds of Indian goats, especially from central and southern regions, show high degree of thermotolerance and are prolific producers and breeders.

What makes the goats unique amongst other ruminants

- Smaller body size
- Ability to consume and digest fodder leftovers or crop residues, trees, leaves, shrubs
- Bipedal stance, which confers ability to reach shrubs and tree leaves
- Ability to convert low quality fodder into high quality meat, milk and hairs
- Good immunity against diseases and all parasitic infections
- Prolific breeding efficiency
- Year round supply of meat, milk and kids
- Less water requirement
- Non-specific housing needs
- Efficient thermoregulation
- Adaptability to draught prone geographical regions

The future of goat farming

With the advent of modernization, urbanization and expanding human population, there will be a greater need for quality food. These human needs can only be sufficed by maximizing animal production in future,with global warming. Already we have seen unbelievable growth in poultry sector in the last 3-4 decades. Unlike cattle or buffalo meat, goat meat or mutton has no religious taboos, anywhere in the world, especially in India.

Goat farming just need to be more sustainable and organized to be profitable and become a major agri-enterprise in India. Here the primary need is good management, quality fodder, disease and pest management (to a minor extent) and protection of animals from heat stress as Indian sub-continent is a tropical location and summer are characterised by high temperatures and humidity for more than 5-7 months. Another urgency is for establishment of specialized meat unions and trading markets Further, emphasis should be on export along with domestic utilization.

The world scenario

Presently, there are more than 11 hundred million goats in the world. Majority of the goat population is distributed in Asia (more than 60 %), followed by Africa, America, European Union (EU) and Oceania (Fig 1). Asia and Africa are still mostly developing nations, with booming populations as compared to America or EU. The animal husbandry sector and dependant trade is also not fully organized, yet. The scope for growth at local, regional and international level are tremendous. Both continents have tropical or subtropical climate, which means heat stress and associated losses are

constant constraint. Optimum animal or shelter management and feeding regimes can ascertain the growth of goatery in coming times in India, Asia and Africa, respectively.

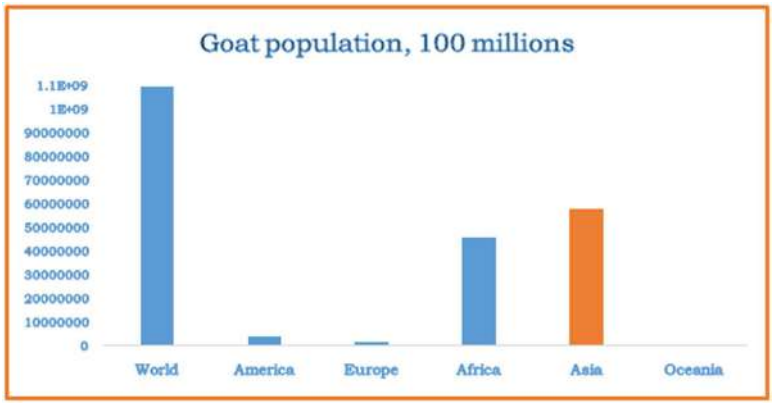

Figure 1. World goat population (Data sourced for FAOSTAT, 2021)

The Asian and Indian scenario

In Asia, India ranks first in goat population, followed by China, Pakistan, Bangladesh and other Asiatic countries (Fig 2).

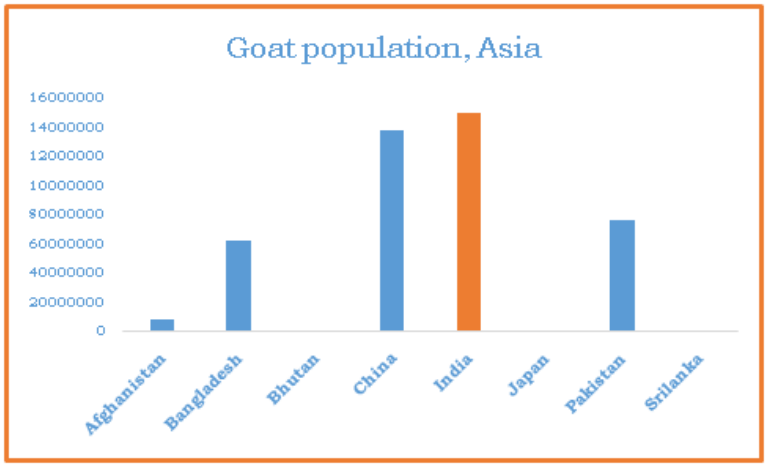

Figure 2. Goat population in Asia (Data sourced for FAOSTAT, 2021)

It means that Indian entrepreneurs have an open market not only in Asia but entire world. Here the scope for expanding internal and external trades is humongous. In the last two decades (1999-2019) the goat population in India has grown at an outstanding pace, almost doubling in this period (Fig 3). Also the export of live animals and revenue generated have grown considerably during the same period in India (Fig 4).

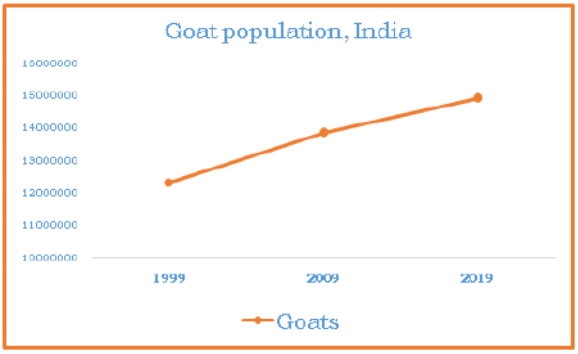

Figure 3. Goat population growth in India during the period, 1999-2019 (Data sourced for FAOSTAT, 2021)

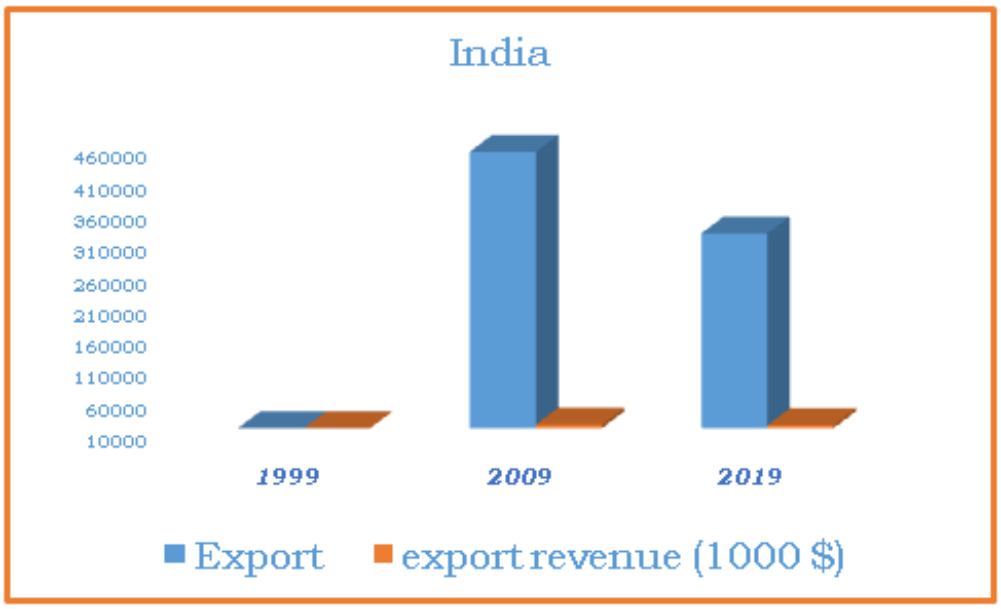

Figure 4. Goat export and revenue generated during the period, 1999-2019 (Data sourced for FAOSTAT, 2021)

Summary

The future of world goatery look bright and there are promising opportunities for all. The developed western nations have already attained pinnacle of industrialization, urbanization and modernization, hence there is less or restricted scope for future growth to different agri-businesses. But the developing regions like Asia and Africa which already have the largest goat populations, have true opportunity to become world leaders in goatery. In future our energies should be channelized to achieve maximum production from our indigenous goats. This can be only achieved by implementation of traditional and scientific practices together, like shelter management and feeding etc. A scientific approach will be essential to change this small scale backdoor enterprise to fully commercial modern goat agri-enterprises, which in future will make goatery one of the most sustainable and profitable industry in India.

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APPLICATION OF ETHNOVETERINARY PRACTICES & VETERINARY HOMEOPATHY/ VETERINARY AYURVEDA IN TREAMENT OF MASTITIS IN DAIRY CATTLE

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ABSTRACT :

The evidence from archeological sciences states that many countrieswere having various methods and practices for management ofanimal diseases. Veterinary science in India has a documented historyof around 5000 years. There exists codified veterinary knowledge in the form of medical texts, manuscripts on various aspects ofveterinary care such as health management of cattle, horses, birdselephants. The veterinary and animal husbandry practices werepresent and grown in the Vedic, Puranic and extending beyond Epicperiods. This knowledge is available in the form of manuscripts calledVeterinary Ayurveda, vizMrugayurveda (Ayurveda for Animals)Pashupakshishastra (Ayurveda for birds), Hasthyayurveda(Ayurveda for elephants), Ashwayurveda (Ayurveda for horses) etc. Understandingthe etiopathogenesis and management of animal diseases throughAyurveda is need of the day. Mastitis is the economically devastatingdiseases of dairy animals. The saints of Ayurveda have explained in detail about mastitis as Sthanavidhradi. The management andtreatment modalities have clearly mentioned in the classics ofAyurveda. This traditional system of Indiacalled Mrugayurveda (Ayurveda for Animals) or Veterinary Ayurvedais robust and time tested. It has been in practice since age old. Thisrobust system of medicine can address the current challenges ofmainstream medicine. Many herbs and formulation from Ethnoknowledge and Ayurveda were in practice in ancient India. So it isimportant to validate and reintroduce these time tested formulationsand herbs for animal health.

Keywords : Mastitis, Sthanavidhradi, Ethnoveterinary, Veterinary Homeopathy/ Veterinary Ayurveda, Dairy Cattle.

INTRODUCTION :

High producing lactating cows are very much susceptible with mastitis which is the most common problem and costly disease of dairy cattle throughout whole world. In mastitis, due to faulty milking practices invasion of bacteria through teat canal leads to inflammation of udder parenchyma cells and tissues. It affects both the quality and quantity of milk produced. Mastitis is defined inflammation of mammary gland, due to effects of infection caused by the bacteria or mycotic pathogens. Mastitis is an infectious disease resulting in an inflammatory reaction in the mammary gland of the cattle. It is the most common disease in dairy cattle characterized by various degrees of severity ranging from a mild disease with no gross changes in the secreted milk but there is an increase in inflammatory cells i.e. somatic cells in the milk, to a moderate disease with an increase in inflammatory cells and gross changes in the secreted milk. It is accompanied by signs of inflammation in the mammary gland such as swelling, redness, and painfulness etc.A pathologic change to milk secreting epithelial cells by the inflammatory process often brings about a decrease in functional capacity. Depending upon pathogen, functional losses may continue into further lactations also, which may decrease productivity and potential weight gain for suckling off-springs. Although most infections result in relatively mild clinical or subclinical local inflammation, while more severe cases can lead to agalactia. Mastitis has been reported in almost all domestic mammals with a worldwide geographic distribution. Climatic conditions, housing, seasonal variations, density of livestock populations,bedding and husbandry practices may affect the incidence of mastitis and its etiology. However, it is of greatest economic importance in species which primarily function as producers of milk for dairy products, particularly the dairy cattle.

Mastitis can be identified by detecting abnormalities in the milk, alteration in pH of milk, udder parenchyma with or without systemic illness. Huge economic losses are mostly due to pathogen-mediated damage of milk secreting tissue of udder and subsequent decreased milk production of affected cattle.Mastitis progresses to a severe disease with above changes in the milk and systemic signs including fever, depression, and "off-feed" and occasionally death may occur in most severe cases. Farmers generally discard milk from the cows with clinical cases of mastitis and from cows undergoing antibiotic treatment according to withdrawal periods in order to provide sufficient time for antibiotics to clear from the cow's body. Thus, the cattles diagnosed with clinical sign of mastitis, or those with persistent subclinical mastitis have a greater risk of being culled. The udder health issues are one of the top three reasons for culling of dairy cattle. But low milk production associated with mastitis is the main leading cause of culling in dairy herds.Toxic mastitis is an acute form of disease resulting in severe inflammation and septicemia thatcan lead to cow death. The clinical

signs in the form of flakes or clots to purulent exudate, discolored, bloody or watery milk, hardening or swelling of the gland and the presence of pain, heat or reddish discoloration of the skin of inflamed glands are prominent. Systemic signs of illness in mastitis include increased rectal temperature, decreased reticulorumen motility, anorexia, lethargy and death. Severity of clinical mastitis cases can range from mild to severe. Although subclinical mastitis is more difficult to identify, monitoring of somatic cell count or bacteriological culturing of milk can helps to detect the presence of mastitis.

In mastitis, most of the infections are caused by various species of streptococci, staphylococci, gram negative rods especially lactose fermenting organisms commonly termed coliforms. From an epidemiologic point of view, the source of infection may be regarded as contagious or environmental. Except for mycoplasma spp., which may spread from cow to cow through aerosol transmission and invade udder tissue and subsequently produces bacteremia, contagious pathogens spread during milking by milker's hand or the liners of the milking unit and this include thespecies like staphylococcus aureus, streptococcus agalactiae and corynaebacterium bovis.The bedding used for housing cattle is the major or primary source of environmental pathogens, but the contaminated teat dips, intramammary infusions; water hoses used for udder preparation during milking, water pond, teat trauma, skin lesions and flies have all been incriminated as sources of infection.

According to the clinical symptoms mastitis may be classified as clinical mastitis and subclinical mastitis. Subclinical mastitis usually leads the clinical form as it is of longer period, difficult to diagnose, adversely affect the milk production and quality of milk and also comprises a reservoir of pathogens that lead to disease of other animals within the herd. Mastitis is the most cost intensive production disease in dairy industry, causing a considerable financial loss.

SUBCLINICAL MASTITIS

It is the presence of an infection without apparent signs of local inflammation or systemic involvement. Although transient episodes of abnormal milkor udder inflammation may appear.These infections are for the most part asymptomatic and if the infection persists for at least two months or more, are called as chronic. Once infection established, many of these infections persists for entire lactation. Detection of subclinical mastitis is best done by examination of milk for somatic cell counts predominately neutrophils by using the CaliforniaMastitis Test and it is positively correlated with the presence of infection.Higher the somatic cell counts in any herd, higher the prevalence of infection in the herd. Causative agents must be detected by bacterial culture of milk sample.Subclinical mastitis is important due to the fact that control of bovine mastitis is challenge because of multiple etiological agents. Most of the antibiotics are used for the treatment and control of mastitis, but intra-mammary infusion of antibiotics for mastitis therapy was cited as a major reason for contamination of milk and repeated and frequent use of antibiotic therapy leads to antibiotic resistance. Increasing emergence of antibiotic resistant pathogens is further suspected to complicate the effectiveness of the treatment of mastitis.

EPIDEMIOLOGY

The prevalence of infected cows varies from 20- 75 % and quarters from 5- 40%. Many different pathogens can develop a chronic infection that will only manifest clinical signs of mastitis. The primary focus of most subclinical mastitis programe is to decrease the prevalence of the contagious pathogensStreptococcus agalactiae and Staphylococcus aureus as well as other gram positive cocci, Streptococcus dysgalactiae, Streptococcus uberis,Enterococci and numerous other coagulase-negative Staphylococci including S. hyicus, S. epidermidis, S. xylosus and S. intermedius. For contagious pathogens, the adult lactating cows are most at risk for infection, either while lactating or during the dry period. The primary reservoir of infection is the mammary glandand transmission occurs at milking with either milker's hand or milking equipments.For the contagious pathogens and coagulase negative staphylococci, there is little or no seasonal variationin incidence of infection.

TREATMENT

Therapy isgiven on the premise that treatment cost will be out-weighed by production gains following elimination of infection. In the case of contagious pathogens the elimination may also result in a decrease of the reservoir of infection for previously non infected cows.

Most other streptococci also show in vitro susceptibility to numerous antibacterials, especially ?- lactum drugs. Many streptococcal infections are not as easily cured as it is caused by S. agalactiae. Generally, subclinical infections caused by S. uberis and S. dysagalactiae should be preferentially treated at the end of lactation with intramammary infusions. S. aureus intramammary infections often result in deep seated abscesses. Therapy is more difficult, as

resistance to antibacterials is more common compared with streptococcal infections and S. aureus may survive intracellularly following phagocytosis when antibacterial concentrations are decreased.

The success rate of therapy for chronic subclinincal intramammary infections caused byS. aureus may be increased by using both parenteral and intramammary therapy. It should be administered for periods long enough 5 - 10 days to allow effective destruction of the pathogen. Depending upon susceptibility test, lipophilic antibacterial drugs that distribute well into mammary gland cell/tissue such as oxytetracycline @ 11 mg/kg, OD are the best candidates for systemic administration. Affected quarter should be observed bacteriologically for ?30 days to encompass the refractory period when bacteria may not be isolated.Occasionally, premature agalactia will occur in chronically infected quarters i.e. particularly quarters infected with resistant pathogens and culling may be a practical option for such cows. Alternatively, it is common to dry off the infected quarter and continue to milk the cow. The goal is to eliminate the infection by developing fibrosis of the affected quarter, thus reducing the risk of further pathogenic changes or systemic effects on the cow, as well as lowering risk of infection for other cows.

CLINICAL MASTITIS

It is an inflammatory response to infection causing visibly abnormal milk such as Color, fibrin clots. As the inflammation increases, changes in udder may also be apparent i.e. swelling, heat, pain, redness increases. If the inflammatory responses include systemic involvement such as fever, anorexia, shock,the case is called as severe. If onset is very rapid with severe clinical sign, it is known as an acute case of mastitis. Any number of quarters may be infected simultaneously in subclinical mastitis. Typically only one quarter at a time will show clinical mastitis. However it is not uncommon for clinical episodes of mastitis caused by mycoplasma to affect multiple quarters.Gangrenous mastitis can also occur, particularly when subclinical chronic infections of Staphylococcus aureus become severe at times of immunosuppression i.e. at parturition. For detection of subclinical mastitis, culture of milk samples collected fromaffected quarters is the only reliable method to determine the etiology of clinical cases.

When the balance between host defenses and invading pathogens reflect a marked inflammatory response, clinical signs become apparent. Infections from any pathogen can be clinical or subclinical depending mostly on the duration of infection, host status and virulence of pathogen. The control of clinical mastitis usually focuses on the prevention and elimination of pathogens which arises from environmental reservoir. Hence the epidemiology and prevention of clinical mastitis is similar to the concepts regarding the control of subclinical mastitis.

TYPES OF MASTITIS ON THE BASIS OF DURATION AND CAUSATIVE AGENT

ACUTE FORM.

In acute form, which frequently accompanies parturition, and also, in

less severe form, at drying off, the onset is usually sudden, and the condition can be

recognized by inflammation of the gland and changes in the quality and quantity of milk. Inflammation takes place in several forms ranging from slight edema to hot painful enlargement. Acute form is seen at any time during lactation, most often seen as a sequel to calving.

CHRONIC FORM

In case of chronic mastitis, feverish manifestations are usually absent,although exacerbations can occur. The mammary gland shows fibrous induration in the region of the milk cistern and the milk itself shows small clots.

MASTITIS CAUSED BY STREPTOCOCCI

In dairy herds where good hygiene andmanagement are poorly practised, Streptococci show a morbidity rate of 20-25%. It is lesscommon in well organised herds, but can still cause a high loss of production, though rarelyresulting in the death of the animal. There is a primary fever which persists for 24hours, but this systemic reaction is invariably mild and is associated withStreptococcus dysgalacticae, Streptococcus agalacticae and Streptococcus uberis develops amore acute syndrome with severe inflammation of quarters and abnormality of milk.

MASTITIS CAUSED BY STAPHYLOCOCCI

There is frequently a per-acute form developing a few days after parturition, and this can be highly fatal, the quarter becoming swollen and purple, and systemic involvement is very rapid. The chronic form of this type is characterized by a slowly developing induration of udder tissue with watery secretion leading to atrophy of affected quarter.

MASTITIS CAUSED BY E. COLI.

Per-acute involvement is very common and can result in toloss of function of affected quarters and death in many

cases. The secretion is thin andyellow contains small bran-like flakes. Temperature may be very high indicating asevere systemic involvement.

SUMMER MASTITIS CAUSED BY CORYNEBACTERIUM PYOGENES

Summer mastitis commences acutely with severe systemic reaction. The quarters involved become indurated and producing a thick cheese-like secretion. The udder later shows abscesses which burst through the outer skin, producing creamy pus with occasional sloughing of tissues. Corynebacteria are well known for the production of invasive toxins causing systemic symptoms.

HERBAL THERAPY OF MASTITIS

Herbal medicinal plants are being used for the treatment of various human and livestock by the local peoples. It is a well known fact that several herbs, shrubs and plants are an important source of ethno-veterinary medicines. Ethno-veterinary practices are more common in almost all developing and developed countries especially in India, Nepal, Pakistan, China, USA, and Bangladesh etc. Herbal medicines serve as safer alternatives as growth promoters due to their suitability and preference, lower cost of its production, and cultivation, improved feed efficiency, fast growth and lowered mortality in dairy cattle.

The various components of several herbs, shrubs and plants are used as medicines for treatment of animal diseases. The herbal medicines comprise plant-based medicines can be used for therapeutic, prophylactic or diagnostic application in animal health care and prevention of diseases. Ethno-veterinary knowledge is acquired through practical experience and has traditionally been passed down orally from generation to generation. Different central & state Universities viz. Central Drug Research Institute, Anand Agricultural University and National Dairy Development Board extensively propagate the ethno-veterinary concept by providing field training to veterinarian and motivating farmers involved in animal husbandry.Ethno-Veterinary practices concern to animal healthcare is as old as the domestication of various livestock species. The extract of various parts of plant has shown to exhibit antibacterial, antifungal, insecticidal and antioxidant activity.

In allopath, the treatment of mastitis requires higher dosage of advanced antibiotics with at least 5-7 days leads to various side effects such as antibiotic residues and toxic metabolites in milk, meat and animal byproducts. Hence, the traditional herbal, homeopathic and ayurvedic medicines are used by the local people for treating the mastitis. WHO has also emphasized on the use of medicinal plant as an alternative to antibiotic therapy. Several herbal extracts have shown in vitro antibacterial activity versus major mastitis pathogens. Some of these are Cedrus deodara, Curcuma longa and Eucalyptus globules which is having anti-inflammatory effect. Identifying the mastitis in early stage and keeping the animal udder in the outmost healthy condition is the only way to prevent the physical and economic losses due to mastitis.

- Application of paste of Turmeric powder and fresh leaves of Moringa oleifera mixed with common salt over the infected udder of cattle & buffalo thrice in a day is very effective.
- Mixture of Aloevera (200gm), turmeric powder (50gm) and lime (5gm) paste was found to be useful to treat all kind of mastitis without any adverse effects. The treated animal recovered within 5 days after therapy.
- Use of 50 gm turmeric powder, 20-25 gm limetone, 250 gm Aloe vera and lemon juice of two fresh lemons, mix it thoroughly to make a paste150-200 ml of water and apply externally over the affected part of udder. Repeat 10 times a day up to 5 days and is very effective.
- Feeding of 20-30 gm camphor in banana fruit twice in day up to three days is very effective in case of mastitisproducing milk with blood or abscess condition.
- Hot fomentation of udder by using neem leaves boiled in hot water with magsulf and boric acid and apply topically over the teat thrice in a day.
- In severe mastitis condition, crushed the 100 gram leaves of sponge guard in 250 ml of water and applies over the affected part of teat or udder and cover with cotton cloths.
- In mild teat infection, freshly plucked & clean leaf stalk of neem leaves and making the paste of turmeric powder with butter or ghee and apply this paste topically over affected teat.
- Use of palm oil, medium chain fatty acids for treatment of mastitis, having the antibacterial properties.
- The extract of, Garlic and Black Cuminis also used for treatment of mastitis.
- Antimicrobial activities of Ageratum conyzoides, Muntinga calabura, Piper betle, and Curcuma domestica have been proved and effective in treatment of mastitis.

- Massaging with mentha oil is also very useful for treating animals suffering with mastitis.
- The fine powder of white stone i.e. Benachu kallu mixed with desi butter. The whole blending process should be over Betel leaf (Piper betle). The mastitis infected udder should be cleaned with fresh warm water which contains turmeric powder and common salt mixture with equal amount. Thereafter the paste should apply over the mastitis affected udder of animal from top to bottom and left for drying about 20-30 minutes. Finally Sambrani smoke used to fumigate the mastitis affected udder for 5 - 10 minutes for better recovery from mastitis.

HOMEOPATHIC TREATMENT OF MASTITIS

- Use of 5-10 drops of Phytolacca-1000 orally in morning hours up to 15 days can be cured from mastitis.
- When udder is hot, painful and edematous, the use of Belladonna 30 or 200 and Urticaria urens 30, is found to be useful.
- In case of fibrosis and nodules formation in secretary tissues we can use Homeopathic drugs Tetasule fibrokit gold, Tetasule Fibro, Fibro-K drops for such purposes.
- 2ml of Calcaria Flour-200C in 100 ml of Luke warm water is administered orally thrice a day is useful. Silicea -200C is also administered in same dose and route keeping a time gap of half an hour between two administrations. The treatment is carried out for at least 15-20 days.
- When udder is very hard with yellowish and cheesy milk, the use of Conium 200 is very useful.

All outbreaks of mastitis call for the employment of various remedies according to the different symptoms, and the animal's reaction to the disease.

Common remedies frequently used are listed below :

Remedies	Indications	Dose
Belladonna 1m	Indicated in the acute form post-partum. The udder shows acute swelling and redness, and pain is obvious on palpation.	One every hour for four doses.
Aconite 6x	It should be used as a routine in all acute cases, especially those which develop suddenly, possibly after exposure to cold, dry winds.	One every half-hour for six doses.
Apis Mellifica 6c	This is a useful remedy for freshly calved heifers showing oedema of udder and surrounding tissues.	One every three hours for four doses
Bryonia Alba 30c	Indicated where the udder swelling is hard and indurated. In acute cases pain will be relieved by pressure on the udder and such cases are frequently presented with the animal lying down as this appears to give relief. Chronic forms showing fibrosis should benefit from this remedy	In the acute form, one dose four-hourly for four doses. In the chronic form, one dose twice weekly for one month.
Bellis Perennis 6c	Somewhat similar in its requirements to Arnica, but Bellis is probably better if the injuries are more deep than superficial, e.g. damage from teat cups	One three times daily for four days which has gone on for a few days.
Arnica Montana 30c	When mastitis has developed as a result of injury to the udder tissue. Blood may be present in the secretion.	One three times daily for three days.
Silicea 200c	Also useful in chronic cases of Corynebacterium pyogenes infection where purulent foci and sinuses have developed as a result of multiple abscesses.	One twice weekly for four weeks

Urtica Urens 6x	For acute forms showing oedema which may be in the form of plaques frequently extending to the perineal area.	One every hour for four doses.
Phytolacca 30c	A useful remedy both for acute and chronic cases. Acute forms may show curdled milk and clots, while in the latter, small clots may appear in mid-lactation. This is probably the most useful remedy for the average chronic case.	For acute cases one three times daily for three days, followed by one daily for four days. Mastitis which appears in the form of small clots in mid-lactation will probably yield to a dose every three hours for four doses
Hepar Sulphuris 6x	This low potency of Hepar will help promote suppuration and clearing of the udder contents in cases of C. Pyogenes or summer mastitis infection.	one every three hours for four doses. Once the udder has been cleared of purulent material, a dose or two of a higher potency should be given to complete the cure
Ipecac 30c	Useful remedy for controlling intra-mammary bleedingwhich results in 'pink milk', or even more frank bleeding.	one three times daily forthree days.
In acute cases	Remedies such as Belladonna, Bryonia and Urtica Urens may becombined as a polyvalent remedy. This will avoid the necessity for separatedosing with each remedy.	

TREATMENT OF SUB CLINICAL MASTITIS :

- When milk tested with a pH paper like bromothymol blue, in sub clinical mastitis, the paper turns to green and in clinical mastitis turns blue.
- Small quantity of milk is directly boiled in a glass and decanted. In sub clinical mastitis the sediments gets attached to the sides of glass. These two methods are 40% reliable.
- Use electronic device to calculate electrical conductivity which is reliable above 95%.

ACUTE MASTITIS

- Echinacea.Q 8drops and Apis Mel CM 6drops in one tea spoonful of water TID/QID. Sulphur30, Carboveg30, Silicia30, Phytolacca30 and Pulsatilla30 each 15 pills TID/ QID.
- Painful swollen udder: Belladonna hourly, Udder Hard but milk not spoiled. Bryonia 200 qid.
- Hard udder with pus in milk. Phosphorus 200.
- In udder oedema, Natrum Sulph 200 depending on the severity the drug/s may be used 5 to 6 times in a day.

TREATMENT FOR CHRONIC MASTITIS

- Use subcutaneously 1/2 ml of injectable Sulphur C 2ml of Calcaria Flour-200C in 100 ml of luke warm water is administered orally thrice a day is very effective. Silicea - 200C is also administered in same dose and route keeping a time gap of half an hour between two administrations. The treatment is carried out for 20 days.

  Treatment : The mode of treatment can be categorized into two groups - mastitis with anorexiaand mastitis without anorexia.

Mastitis with Anorexia

- ✓ **Belladonna 30 or 200 :** When the udder is hot, painful and edematous.Dose: Belladonna 30: one dose every two hours 4 to 5 times till reliefBelladonna 200: B.I.D for 2 days.
- ✓ Bryonia 30 or 200: When udder is hard, painful and hot, Dose: One dose every 3 hrs till relief
- ✓ Urticaria urens 30: When the udder is hard, painful, edematous with allergicreactions and let down problems,Dose: One dose every 1 hour till relief
- ✓ Homeopathic Combination: Belladonna, Bryonia Urtica 30, Dose: 1 dose once in 2 hrs till temperature comes to normal.

- ✓ Phytolocca 200: When the udder is hot, with flakes and clots in milk andrefuse to allow the calf for suckling. Dose: 1 dose 2 hourly 4-5 doses for 2-3 days.
- ✓ Conium 200: When the udder is very hard, with yellowish and cheesy milkand painful udder.Dose: B.I.D. for 2 - 7 days
- ✓ Merc sol 200: When the udder is hard and when the milk is watery orserosanginous in appearance (Foot and Mouth affections)Dose: B.I.D. for 2 days
- ✓ Silicea 6x: Udder indurated, milk cheesy in consistence, with yellow clotsDose: T.I.D for 1 week to 10 days
- ✓ Biochemical Preparation 1: Kali mur 6x when clots in milk
- ✓ Calc Flur 6xDose: B.I.D. for 1 week to 10 days
- ✓ Homeopathic Combination 1: For intra mammary use.

  Calundula Q, Belladonna 30, Dulcamara Q, Echinaea 30 aa 1 mlMade upto 20 ml with distilled water. Indications: Inflammation of the udder with loss of appetite, fever, congestion and trauma.Dose: 10 ml Morning and 10ml night, intra mammary injectionfor 2 to 3 days. Massage the udder to disperse the medicine uniformly
- ✓ Homeopathic Combination 2: For External use onlyPhytolocca decandra 30, Calendula officinalis Q, Apis mel 30, Belladonna 30 aa 1 mlMade up to 20 ml with glycerine.Dose : Apply on the affected teats and udder, B.I.D. for 2 - 4 days
- ✓ Homeopathic Combination 3: For internal use

  Phytolocca 200, Calc. Fluor 200, Silicea 30, Belladonna 30, Arnica 30, Conium 30, Ipeca 30 aa 0.5 ml. Made up to 30 ml vimeral.

  Indications : In acute, subacute and chronic mastitis.Dose: 2 -5 ml, B.I.D. orally for One week.

Mastitis without Anoexia

- ✓ Kali Mur 30: Hardness and White or gray or cream colour clots.Dose : 4 time a day for 2 to 5 days
- ✓ Ferrum Phos 6x: Blood in milk with or without bad smell. Dose : Q.I.D for 2 to 5 days
- ✓ Silicea 1M + Calc. Sulph 200: When udder is hard and with clotsDose: Q.I.D for 2 -7 days.

Oxytocin treatment :

Effective treatment of mastitic cattle depends on complete removal of milk from the teat cisterns. It can be achieved by increasing the intervals of milking. Bacteria thrive in milk because it gets nourishment from the milk andwhen the teat canal is emptied, the bacteria do not find nourishment and the antibacterial drugs will be more effective. The cows can be injected with oxytocin to increase milk let down so that complete milking can be achieved easily.

AYURVEDIC TREATMENT OF MASTITIS

As per the texts of Ayurveda, mastitis is known as Sthanavidhradi, a disease of pitta origin, the drugs used in this formulation (Aloe vera, Curcuma longa and Calcium hydroxide) means three ingredients viz. Gheekumari (Aloe vera) 2 or 3 petal, Haldi (Turmeric) powder (50gm) and Chunna (Lime stone)- 10 gm is potent pitta shamaka. This formulation possesses Krimighna (antimicrobial), Vranashodaka (wound cleanser), Vranaropaka (wound healing), Shothahara (anti-inflammatory) and Srotoshodaka (channel cleanser) properties. Hence, mastitis can be efficiently managed with this formulation by application of such paste at least for 7-10 days. The antimicrobial activity of Aloe vera is attributed to the anthraquinones (aloin and emodin), flavonoids, tannins, saponins, p-coumaric acid, ascorbic acid, pyrocatechol and cinnamic acid. Alkaloids, tannins, phenolics, terpenoids, phytosterols, saponins, flavonoids, glycosides, fatty acids such as palmitoleic acid and ?-turmerone in fixed oils of Curcuma longa also possess antimicrobial activity against wide range of bacteria. The anti-inflammatory activity of Aloe vera is reported to be due to its Brady kinase which decreases vascular permeability, neutrophil migration, and leukocyte adhesion and lowers edema formation. It is also found to reduce the production of TNF?, inhibit PGF2? and TB4. Calcium hydroxide is known to possess anti-inflammatory action and lowers edema formation. Thus all the three ingredients in the formulation act at various steps in the inflammatory pathway and synergistically develop anti-inflammatory effect. Curcumin possesses immunomodulatory and antioxidant activity while polysaccharides present in Aloe vera are rich source of mannose and act as biological response modifier by targeting antigen presenting cell. The ingredients are as follows.

1. Gheekumari (Aloe vera) - 2 or 3 petals
2. Haldi (Turmeric) powder - 50 gm
3. Chunna (Lime stone) - 10 gm

All the above ingredients are ground well and made a paste, apply over the udder thrice a day for 3-7 days depending upon the disease incidence. Before applying, the udder and teats should be washed with boiled water for 2- 3 times for 5 days. Administration of orally 50 gm of sodium bicarbonate in the juice of lemon dissolved in 200 ml of water is also effective.

PREVENTION :

1. **Hygiene**

   Since the milking equipment can serve as a inanimate object which can transfer infection. Hence proper hygiene is essential to control mastitis.

2. **Disinfection and dry cow therapy**

   The use of post-milking disinfectant teat dip and antibiotic dry cow therapy help to decrease the prevalence of mastitis. Environmental pathogens are less likely to be spread during milking. Usage of pre-milking teat dip prior to milking can further lower this risk.

3. **Management**

   Various management practices have helped with prevention of the bovine mastitis caused by contagious pathogens. Well organized herds have been successful in limiting contagious mastitis. Control of contagious mastitis is possible and repeatable across herds when implementing these above practices.

   - ✓ Dip the teats in a germicide after every milking to reduce incidences of the disease.
   - ✓ Treat each quarter separately with suitable antibiotics to avoid disease prevalence.
   - ✓ Milk infected cows at the last and use separate milk handling equipment for their products to avoid cross contamination.
   - ✓ Use individual disposable towels for cleaning the udders. If you have to use a cloth towel, each cow should have a separate towel and clean the towel thoroughly with hot water after milking and air dry.
   - ✓ The milkers should be clean and preferably wear latex gloves while milking.
   - ✓ Give your heifers dry-cow antibiotic treatment if they have Staphyloccocus aureus infection. Clip the udders to minimize dirt dangling around the teats.
   - ✓ Pre-dip the teats in a germicide before milking and ensure you only milk clean dry teats.
   - ✓ Keep the cows standing after milking to ensure that their teat canals close to avoid entry by bacteria and achieve this by giving the cow some feed.
   - ✓ Use single-dose infusions to avoid cross contamination when performing udder cleaning and sterilization.
   - ✓ Maintain high levels of hygiene by keeping the milking parlour neat and clean, using clean milking equipment, and using sterile teat dippers. Clean the pipes regularly to avoid bacterial growth.
   - ✓ Cull chronically ill animals.

CONCLUSION

The excessive, exhaustive and indiscriminate use of higher antibiotics for treatment of mastitis with steroidal and anti-inflammatory drugs leads various side effects along with their residual effect in the milk, meat and other animal products and byproduct as well as there may be development of antibiotic resistance. Health hazards issues will be developed by use of hard and prolong antibiotic treatments for mastitis. The infected milk from affected teat should be drained out thrice a day and safely disposed. A composition of 5% phenol can be usd to the infected milk to ensure hygienic disposal. Hence, for treating the animal diseases like mastitis, ethno-veterinary medicine, homeopathic and ayurvedic treatment is now safer and better alternatives for animal health concerned. There is a great need to start the awareness programme about the collection, dispersal of traditional knowledge and compilation of facts about the ethno-veterinary practices by the farmers. While milking the herd, strict attention must be given to first milking healthy, non-infected cows and subsequently infected cows. The infected and non-responsive quarter should be dried off permanently. Calves should be prevented from suckling on the infected teats. Government of India and state government should also taken necessary initiatives to appreciate the ethno-veterinary practices and starts a course curriculum by implementation of degree or diploma course to enhance the knowledge and conduction of research about the ethno-veterinary practices along with homeopathic and ayurvedic treatments for mastitis and other animal diseases.

SUMMER MANAGEMENT IN BUFFALO

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What is Summer Management

Proper feeding, housing and thermal ameliorative techniques are primarily necessary to overcome sub- reproductive problem in buffaloes linked with summer stress. Growth rate of buffalo heifers fall during severe hot months of the year due to inadequate intake, lack of excellent quality greens, diversion of better feeds to producing buffaloes at the cost of expanding stock, overcrowding and improper habitat.The research findings on summer management have suggested that adequate feeding and supply of thermal amelioration including proper housing are useful in attaining optimum growth in buffalo heifers. Growing buffalo calves kept in loose house grow better notably during extreme hot seasons than the calves housed inside the shed as loose housed animals spend maximum time in feeding and rumination.Buffaloes in loose housing system devoured more dry matter and water, generated more milk than those kept in the closed barn. Physiological reactions of buffaloes housed in shed were higher as compared to buffaloes in the open barns.

Amongst numerous climatic situations, it is the hot weather that ubiquitously impairs the productive and reproductive performance of cattle species. The plains, coast-line and foot-hill regions of the Indian subcontinent, home to over 90 percent of the world's buffaloes, face variable and extreme weather conditions, with temperatures reaching up to 48^{O}C in summers and as low as minus 2^{O}C.

How to recognize heat stress

- **Changes in consciousness :** Rapid and weak pulse, rapid but shallow breathing;
- **Abnormal vital parameters :** Elevated heart rate, respiration rate, rectal temperature;
- **Unusual salivation :** Capillary refill is very fast
- I**n case of heat stroke -** Very high body temperature sometimes as high as 106-108□F. Heat stroke is life-threatening, so immediate veterinary attention is a must while moving the animal to a cooler place, giving a bath with cold water or wrapping in wet sheets and providing a fan.
- **Signs of heat exhaustion :** Dizziness/unconsciousness; skin becomes dull and may be cold too.

Common terms associated with heat stress

- Muscular pain and spasm due to heavy exertion in a hot climate.

- Excessive loss of body fluids (usually through sweat) leading to fatigue.
- Break-down in the thermoregulatory system of the body leading to increased internal temperature with no sweating and death, if not immediately treated.

Management of heat stress

Modification of the micro-environment / Use of cooling system.Good management procedures include alteration of the surrounding environment to lessen the effects of environment and at the same time increase heat loss from the animal. Combating heat stress in buffaloes can be by numerous management measures such as the provision of shade, promoting air movement and regularly soaking the animal with cold water for greater evaporative cooling.

Shade-Simple shade is the fundamental method of sheltering animals from direct sun radiation in day-time throughout summer. The most effective source of shade is the trees and plants. They provide not only protection from sunshine, but also generate a cooling effect by the evaporation of moisture from their leaves.

Air movement-Air movement becomes more crucial during hot-humid conditions for giving cooling and comfort to the animal. Apart from relocating animal to shaded airy spot, fans or dairy fans and different types of coolers can also be put for making the place airy. Air movement increases the rate of heat loss from animal's body surface, only as long as the air temperature is lower than the animal's skin temperature.

Evaporative Cooling-Numerous cooling solutions have been created such as holding-pen cooling, exit-lane cooling, and free-stall cooling. These solutions are suited for the animals maintained in covered pucca sheds. An evaporative system which employs water mist with fan is more effective and economises water use in contrast to repeatedly bathing the animals. Some farmers prefer sprinklers or mists, Water sprinklers generate a large volume of wastewater.

Feeding strategies in hot environment-There are numerous critical aspects of nutritional management which should be examined during hot weather. These include specific formulation to cater for lower dry matter intake with matching higher availability of critical nutrients and to compensate for dietary heat spike while avoiding nutrient excesses. The energy requirements of nursing buffaloes also increase during high-temperature condition but this increase is apparently caused primarily by the increase in metabolic energy.

Water intake- Water is the most important nutrient for buffalo during hot climate. Water intake is closely related to dry matter intake and milk yield, but regardless of the rate of increase, it is important that abundant water must be available at all times under hot conditions. Hot weather, declining dry matter intake and high lactation demand require increased dietary mineral concentration. The primary cation in bovine sweat is potassium. Sharp increases in the secretion of potassium through sweat occur during hot climatic conditions Alterations in mineral metabolism also affect the electrolyte status of buffalo during hot weather. So it important to supplement minerals during hot climate.

Night Grazing- Buffaloes kept in a shed maintain rapid heartbeat during the night. However, when the animals are allowed out into a pasture at night, these physiological responses decrease immediately. This is the result, both of a reduction in radiation heat from the surrounding buffaloes, as well as increased heat loss from the animal itself.

Feeding High-Energy Diets- Low-fibre, high fermentable carbohydrate diets lower dietary heat increment compared to high fiber diets. Although the metabolic energy of dairy buffaloes increases in a hot environment, heat stress depresses feed intake. For this reason, it is important to increase the energy content of the diet of dairy buffaloes, in order to maintain their energy intake under hot conditions. The heat increment, which is an internal heat stressor in hot environments, is lower in highly metabolizable diets. So it is imperative to use fatty feeds, or calcium salts of fatty acids, as the means of improving energy supply for buffaloes in summer. Buffaloes fed on such diets have higher milk yield, and a lower body temperature and respiration rate.

Feeding by-Pass Protein- Dietary protein degradability is also critical under heat stress conditions. It is well known that excessive protein intake increases heat production and decreases reproductive performance. However, the protein requirement of buffalo increases and dry matter intake decreases in a hot environment, consequently, the protein supplied to lactating buffaloes during summer is not always sufficient. By using fish meal, which is a by-pass protein, the milk yield and protein content of buffalo milk increases but the ruminal ammonia production decreases.

Conclusion

In hot-humid climates, although buffalo attempts to acclimatize through physiological changes including cutting down on feed intake and heat production, this does not come without sacrificing part of its productivity. In order to prevent this economic loss to the farmer, there is need to understand and effectively combat heat stress by minimizing its impact on the animal body and its productivity. ❖

SUMMER STRESS MANAGEMENT IN LIVESTOCK

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Abstract :

Summer stress affects the fertility and reproductive livestock performance by compromising the physiology reproductive tract, through hormonal imbalance, decreased oocyte quality and poor semen quality, and decreased embryo development and survivalStress is defined as a state of physiological or psychological imbalance resulting from the disparity between situational demand and the individual's ability or motivation to meet those demands. It is inability of an animal to cope with its environment, a phenomenon that is revealed by a failure to achieve genetic potential, e.g. for growth rate, milk yield, disease resistance, or fertility. During summer when environmental temperatures move out of the thermo-neutral zone then dairy cattle begin to experience heat stress. Environmental (heat/cold), nutritional (feed/water deprivation), social and psychological (fear/restrain), internal (disease/toxin/pathogen), physiological (altitude/ pregnancy/ lactation), transportation/ training/ management are different types of stress in dairy animals. These conditions affect animal productivity and health status of animals.

Keywords : Summer stress, Animal housing, shed, design, width and sizeof shelter,cooling system, feeding management,

Introduction :

In summer season Heat stress in dairy animals is one of the major causes of decreased productivity and fertility during summer months. The crossbred animals are more prone to heat stress. In India, the summer temperature goes beyond 45 C which is 18 C above the upper critical temperature of dairy cattle. When the temperature exceeds 27even with low humidity, the temperature is above the comfort zone for the high producing dairy cows. Humidity plays significant role in heat stress. The most common index of heat stress (temperature humidity index or THI) is calculated from the temperature and relative humidity (RH). At high ambient temperature the animals waste their feed energy in Panting and Sweating the nature's way of cooling animals by evaporation. During summer the milk production is reduced to the extent of 50%. The crossbred / exotic animals are more susceptible to the heat stress losses as compared to indigenous cattle.

Armstrong (1994) reported that by evaporative cooling, the cow gives 7.5 kg more milk per day when the enviouremental temperature was about 40.5 C (RH less than 30%). Igono (1986) observed that cows shed cooled with spray and fans produced 2 kg more milk compared to the cows in shade alone. Armstrong (1994) reported following responses in animals during heat stress.

- Reduced feed intake
- Increase water intake
- Change in the metabolic rate / maintenance requirement.
- Increased evaporative loss
- Changes in blood hormones concentrations.
- Increase body temperature.

There are many other factors, which influence the severity of heat stress. These include

- Environmental condition
- Level of production & feed consumed
- Stage of lactation
- Cooling management.
- Exercise requirements
- Breed and Body colour

All these factor influence heat production, degree of stress and effectively the low dissipate heat. These factors responsible for low in milk yield and reduce fertility. These losses during summer can be reduced substantially by adopting the following heat stress management.

- Proper summer oriented housing
- Animal cooling system
- Development of breeds tolerant to heat stress
- High energy feeding.

Summer stress :

In summer season the stress for the dairy cow can be understood to indicate all high temperature-related forces that induce adjustments occurring from the subcellular to the whole animal level to help the cow avoid physiological dysfunction and for it to better fit its environment.Heat stress is the significant burden to animal in most areas of world and subtropical and tropical parts of our country. During summer heat stress is primarily by high air temperature, but intensified by high humidity, thermal radiation and low air movement.

Effects of summer stress on livestock :

- Body temperature is elevated due todisturbed heat dissipation mechanism.
- Panting and Increased respiration rate isfirst sign of heat stress (>70/min). Itdisturbs the calcium homeostasis and acid base balance, this leads toincreased chances of hypocalcaemia andmilk fever.
- Increased maintenance energyrequirement through variousmechanisms animal tries to dissipate theexcess heat and maintain bodytemperature. Due to this the maintenanceenergy requirement may increase by 20-30% in animals under heat stress. Thisdecrease the energy available forproduction functions.
- During heat stress decreased blood flow to therumen and intestines, Dry matter intake reduced by 8-12% or more, to avoid increasedheat production from feed digestion,increased water intakes that fill thestomach (Saini and Chandrahas, 2013).
- Decreased milk production.
- Folliculogenesis and embryo development is affected due to heat stress. Redistribution of blood flow from theviscera to the periphery during heatstress, leads to reduced perfusion ofplacental vascular bed, retarded foetalgrowth (Alejandro et al., 2014).

Economic impacts of summer stress :

The economic loss is direct result from summer stress that affect the reproductive activity and production of milk as well as quality, heifer growth, increasing cow andcalf mortalities and health care costs.Urdaz et al., (2006) conducted a study ondairy cows which reared under feed line sprinklers and feed line sprinklers with shade & fans. He found that production increased 60 days milk yield in feed line sprinklers with shade & fans ,decreased postparturient disorders andserum non-esterifies fatty acidconcentrations and gained annual profits by 8.92/cow.

Management of summer stress in livestock :

Physical modification of the everyenvironment is based on two concepts

- Protecting the cows from the factorscontributing to heat stress.
- Enhancing evaporative heat loss by theanimal Heat abatement system such asshades, fans, for misters and sprinklersare use to alleviate heat stress of highproducing cows during summers.

Temperature and humidity of animals housing :

The cow sheds in Indian conditions should be designed to reduce the heat load because heat stress because more damage to animals compared to winter. Animal can tolerate winter condition up to 150 C without any difficulty. But the temperature above 30 0C results in drop in milk production and breeding efficiency. Therefore our cattle's especially crossbreds must be provided with proper housing. Theoretically speaking, the best type of animal shelter is a one where the microenvironment temperature remains within 15 to 250 C and humidity level around 10-12 mm Hg. Shades of trees provides an ideal protection from radiant heat, but do not fit because of other reasons.

Orientation of shed :

Shed with its long axis running East - West providesa cooler environment than one with a North-Southorientation (Kelly et al, 1950). In the East- West orientedshelters animals get more opportunityto exchange radiation with cooler north sky. The shelter is shaded for a maximum part of the day resulting into lower floortemperature. Thus this orientation favours heat lossfrom animal body to environment both by radiation and its shadow. This helps in cutting down heat gain from roof. Roof - may be either single or double with both the roofs of same or different materials.

Design, width and sizeofshelter :

Open type of sheds are more effective than closed type of shed because temperature in close type shed was significantly higher than those of open type shed. The close type shed significantly contributed to higher ambient temperature during both hot dry and hot humid months i.e. from April to September. Slightly more shaded area than the minimum recommended floor space required for different species of livestock should be provided in hot dry climate. Floor space requirement for calf is 1.5 to 2 m2, Adult male 7.0 m2 and for adult female is 4.0-5.0 m2. Optimum width of the shelter is 5.0-6.0 m. although wide shelter results in lower ground temperature underneath it and thus the amount of radiation from ground to animal body is reduced. Yet is simultaneously restricts the radiation from animals to cooler sky during night. Length of shelter depends on requirements. Ensure minimum cow stand of 5.5 x 9.0 feet with Pacca and well drained floor. Minimum roof height should be 10.0 feet to reduce heat load. The height of shelter in hot climate should be between 3.0 - 5.0 m. A height less than 3.0 m interferes with proper ventilation resulting into reduced convective heat loss from animals. The impedance of the total sun and sky radiation at 3.5 m height is 61% against 64% at 2.2 m height. A too high shelter without providing any significant additional benefit involves high cost of construction.

Shape and type of roof :

The shape of the roof can be either flat, slopped or "A" shaped. "A" shaped roof is definitely better than a flat roof in hot climate. One side of "A" shaped roof saves the other half form direct solar radiation by casting its shadow. This helps in cutting down heat gain from roof. Roof - may be either single or double with both the roofs of same or different materials.

Roofing material its cooling system :

It may be Hay or Straw, Galvanised steel, Plywood and several types of plastics are the roofing material. On a typical summer day differences in radiant heat load under shades covered with straw and galvanised iron or plastics were of the order of 163 K cal/hour/ m2 of animal surface. A 4-6 inch thick hay thatch does not receive much heat from the upper surface by conduction. The surface convective co-efficient of the hay, because of its uneven surface is also high. Hay thatch is more suitable for hot dry climate than hot humid climate (need for frequent removal of thatch is limiting factor). Wood makes good shed material but in it cracks develops and it needs treatments frequently. Asbestos sheet are more effective as top layer in double roof shelter. If the roof is sprinkled, the temperature of the roof can be reduced upto 28 C by application of 1.5-1 water per hour and per square meter roof area. If a wall or a roof is wet, energy and therefore heat will be used to evaporate the water. Therefore radiated sun energy will be reduced.

Colour of roof and walls :

It should be white outside and coloured inside Reflectivity of white colour is around 75%. The reflectivity of the underneath surface should be less atit determines the quantity of incidental energy from theground which will be reflected back down to theanimals. Radiant heat load on the under surface of an aluminium roof having white paint on top and velvet - black inside was observed to be about 13 BTU/ feet2 / hour less than unpainted roof made of the same material. Painting of side walls white from outside reduces the surface temperature of the walls inside by 12 to 220 C in comparison to unpainted walls at air temperature of the walls inside by 12 to 220 C in comparison to unpainted walls at air temperature above 370 C.Water troughs should be kept under shade ensuring 24 hours water availability.

Sprinklers :

Sprinkler cooling is a process whereby water droplets are applied to wet the cow's hair coat to the skin, and fans are used to force dry the cow. Sprinkling does not attempt to cool air as in the case of fogging and misting but instead uses large water droplet size to wet the hair coat to skin. Cooling is accomplished as water evaporates from hair and skin. In combination with forced air, sprinkling increases the loss of body heat over that possible by sweating alone (Nagpal et al., 2005). Sprinklers cows before entering a shade reduced respiration rate by 65-81% and body temperatures by 46-50% over shade alone. Using sprinklers in combination with supplemental air flow proved to be superior to a fan alone or sprinkling. A combination of fans and misters is as effective as fans and sprinklers at maintaining intake and milk yield.

However, the fan/sprinkler system used about 10-fold more water than did the fan/mist system (Urdaz et al., 2006). It is found that cooling using fans and sprinklers improved DM intake by 7 to 9%, milk yield by 8.6 to 15.8%, reduced rectal temperature by 0.8-1.0□C.

Feeding management during summer :

Points to be consider while feeding animals during hot weather, as feeding frequency, (extra feeding) time of feeding, (cooler time of a day, adequate feeding space and plenty of cool water. Modification in ration can help to minimize the drop in milk production, decreasing forage to concentrate ratio, result in moredigestible rations. Feeding buffers such as sodiumbicarbonate and magnesium oxide allow higherconcentrate rations and can help in low fat milksyndrome also. Hot weather increases the need ofcertain minerals. Do not overfeed highly degradableprotein during hot weather it should be 18% or less.Supplemental fat can be added in ration to increaseenergy in take. Also avoid feeding excess fat, overfeeding causes problem with rumen functionsupplementing extra vitamins during summer has no.

Conclusion :

The summer stress affects the animal reproductive performance and profitability, by lowering feed intake, nutrient utilization and production. We cannot control the weather in case of heat related stress, but we can do everything reasonably possible to reduce various kinds of the stress effects on animals.

SUMMER STRESS MANAGEMENT IN LIVESTOCK

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Introduction

The high ambient temperature and humidity of a typical summer season combine to make a very uncomfortable environment which negatively affects the welfare and productivity of livestock. Considering the tropical climate of Indian subcontinent, the summer stress is a major problem in managing animals in India. During the extreme hot humid or hot dry weather, thermoregulatory capability of animals to dissipate heat by sweating and panting is compromised and Summer/heat stress occurs. Severe heat stress can further lead to rise in body temperature, increased pulse rate, increased peripheral blood flow, reduced feed intake, and increased water intake.

Different part of India have different stressful period for livestock

Part of India	Stressful period
Northern India	May-September
Western India	May-September
Southern India	April-September
Eastern India	April-October

Summer stress in cattle and Buffalo

Cattle and buffalo are homoeothermic animals and need to maintain a constant body temperature of around 38.8^{O}C +/- 0.5□C. They are sensitive to factors which influence their thermal exchange with the environment. These factors include air temperature, radiant temperature, air velocity and relative humidity. Crossbred and exotic breeds of cattle are highly sensitive to heat stress during summer, while indigenous cattle breed are more thermo-tolerant. Buffaloes are more prone to this owing to their black skin that absorbs more solar radiations and fewer sweat glands (1/6th that of cattle), compromising heat dissipation through evaporative heat loss.

When the environmental temperature goes beyond Upper critical temperature (24^{O}-26^{O}C for Exotic and crossbred cattle and 33^{O}C for Zebu cattle and 36^{O}C for buffaloes), body is unable to maintain the core body temperature through sweating and panting (evaporative heat loss mechanism). In India, the summer temperature goes beyond 45^{O}C which is 18^{O}C above the upper critical temperature of dairy cattle. When the temperature exceeds 27□ even with low humidity, the temperature is above the comfort zone for the high producing dairy cows. Humidity plays significant role in heat stress. The most common index of heat stress (Temperature humidity index or THI) is calculated from the temperature and relative humidity (RH).

Economic importance : All the changes associated with summer stress lead to loss of productivity, reduced breeding efficiency and even loss of life in extreme cases. Every year in India severe loss in milk production incurred due to heat stress during summer causing huge financial loss. During hot summer weather, milk production may decrease by as much as 50 percent and reproductive proficiency of lactating dairy cows is greatly diminished by decreasing oestrus expression, conception rate and by increasing length of service and dry period.

Summer stress in swine

Because pigs cannot efficiently sweat, and they have small lungs, and thick layer of subcutaneous adipose tissue,make these difficult to self-regulate their body temperature, it is important to maintain their environmental temperature as low as possible during the warm months of summer.

During summer stress, by reducing feed intake they try to decrease internal heat production. During prolong heat stress, pigs start to drink excessive amounts of water which leads to a loss of electrolytes via the urine and accumulate acids produced within the body resulting in acid-base imbalance, which eventually leads to diarrhea or even death in severe condition.

Summer stress in sheep and Goat

Sheep and goats tend to be less susceptible to heat stress than swine, cattle, and buffalo. Hair sheep usually tolerate heat better than wooled sheep. This is why they are often used for training and trialing herding dogs. Fat-tailed sheep are also more heat tolerant.

Goats tend to tolerate heat better than sheep. Goats with loose skin and floppy ears may be more heat tolerant than other goats. Angora goats have a decreased ability to respond to heat stress as compared to sheep and other breeds of goats. Dark-colored animals are more susceptible to heat stress, while light-colored animals may be prone to sunburn. Females usually handle heat better than males. The heat is especially hard on fat animals.

Weight gains is very less in summer season due to heat stress. Due to sunstroke there is occurrence of diarrhea and concentrated urine in effected sheep and goat

Common symptoms of heat-stressed animal

- Animal moves to shade
- Water intake enhanced while feed intake reduced
- Prefers standing than lying down
- Increased respiration rate, body temperature
- Increased production of saliva
- Open-mouth panting

Strategies to combat summer stress

While stress during summer cannot be avoided entirely, it should be the goal to minimize stress. Methods to reduce summer stress are can be categories into two (1) Managemental practices (2) Feeding management

1) Managemental practices

Scientific management practice has a vast contribution in sustainable and profitable livestock farming. When summer stress become a constraint for animal welfare and profitability, farmers need to look the matter seriously and have to adopt good, scientific management practice to overcome negative impact of summer stress on animals. Under managemental practices, emphasis should be given on proper water supply, proper animal housing to reduce or to manage heat stress.

(a) Proper water supply

Animals need to increase water intake during time of heat stress during hot summer to dissipate heat through respiration and sweating. Water consumption increases by as much as 50% as the environmental temperature rises.

- Water should be fresh, clean and cool (70- 86 F).
- Water should be available for 24 hours in a day
- It should be close to shed with enough water space.
- Provide at least two water locations per group of animal.

(b) Proper animal housing

The animal sheds should be designed to reduce the heat load because heat stress during hot summer cause more negative impact to animals compared to winter. Though animal can tolerate winter condition up to 150 C without any difficulty, while temprature above 30 C result in drop in milk production and breeding efficiency. The best type of animal shelter is a one where the microenvironment temperature remains within 15 to 25 C.

- Orientation- The East- West oriented shelters provides a better cooler environment compare to North-South orientation, which favours the animals for radiation exchange with cooler north sky. Floor temperature remain lower maximum period of the day.
- Height of the shelter- Minimum roof height should be 10.0 feet to reduce heat load. The height of shelter in hot climate should be between 3.0 - 5.0 m
- Shape and type of roof -The shape of the roof can be either flat, slopped or "A" shaped. "A" shaped roof is definitely better than a flat roof in hot climate.
- Roofing material- It may be Hay or Straw, Galvanised steel, Plywood and several types of plastics are the roofing material.
- Colour of roof and walls- It should be white outside and coloured inside. Reflectivity of white colour is around 75%.
- Ventilation- Proper ventilation at ridge level keep two or three walls open

(c) Cooling systems in the farm

- Use of water as cooling agent either directly on animal body or for cooling the shelter micro environment is as widely accepted practice.
- Fans in combination with water sprinkling facility provide the best cooling option. Excessive sprinkling should never be practised as it can result into wet bedding making animal prone to mastitis and other diseases.
- During summer, we can reduce heat load of animals artificially by spraying small quantity of water on their body at repeated interval of 15-30 minutes
- The farm should be well ventilated.

(d) Breeding Management

- Good heat detection program -As animal exhibit lesser heat symptoms during heat stress zones as compared to thermal comfort periods, it is necessary to adopt a good heat detection program to detect cows with marginal heat symptoms.
- Artificial insemination- It is always advisable to continue AI breeding instead of using bulls because in natural breeding both bull and cows suffers infertility due to summer stress.
- Genetic selection of heat tolerant animals- and inclusion of heat tolerance as a trait in selection programme will be a boon to the farms.

(2) Feeding Management

Heat stressed animals during summer are more likely to have lower reproductive and productive performance. Feeding high quality forages and balanced rations will combatnegative effects of heat stress and will boost performance of the animals.

Some feeding and nutritional management tips to manage heat stress are :

- Provide high quality feeds like total mixed rations
- Increase the frequency of feedings
- Avoid feeding during the hottest period of the day (between 10.00am-4.00pm),
- Keep feed fresh as much as possible
- Provide high-quality forage
- Provide adequate fibre
- Use of by-pass proteins can enhance the milk yield and protein content.
- Intake of sufficient cool water is probably the most important strategy for animals to undertake during heat stress.
- Prefer grazing during early morning & late evening hours to avoid the scorching heat

Conclusion

Summer stress causes serious impact on variety of reproduction and growth parameters. It has direct (increased core temperature) and indirect (reduced nutrient intake, Summer infertility) effects on multiple physiological systems that ultimately compromise animal health and productivity. To combat potential problems with animal welfare, animal farmers need to recognize and monitors symptoms of heat stress during hot summer. Implementing all these managemnetal and feeding strategies to managesummer stress will do positive impact on sustainable and profitable livestock farming.

ALTERNATIVE THERAPEUTIC EFFICACY OF THUJA OCCIDENTALIS FOR WART RELATED MASTITIS IN CATTLE

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ABSTRACT

Mastitis is one of the most commonly encountered disease in dairy cows and responsible for the extreme economic losses in dairy farms. Clinical symptoms of mastitis may be vague in cases of viral infection, with prominent other clinical symptoms. Subclinical mastitis cases cannot be generally detected and as a consequence, they are not studied very well. There are many viral agents associated with bovine mastitis and which may cause subclinical mastitis in dairy cattle. Bovine Parainfluenza-3 (BPIV-3), Bovine Papillomaviruses (BPV), Bovine Herpesvirus 1 (BHV-1) could cause clinical and subclinical mastitis. The most common treatment method available against bovine mastitis is the intra-mammary infusion of antibiotics. However, their use is allied with the problem of antimicrobial resistance. Medicinal plants with their well-established history are an excellent natural product resource used as an alternative therapy.This scenario has made search for alternative treatment for bovine mastitis.

Keywords : Subclinical mastitis, Wart,ThujaOccidentalis,Homeopathy

INTRODUCTION :

Cows are considered holy to the people of Hindu faith across the Indian subcontinent. It is known as Kamadhenu, or divine cow, and the contributor of all needs.The Hindu religion knows the rights of animals to co-exist with humans; therefore, people are taught to love, nurture and worship them. From a source of milk to a provider of labour and religious inspiration, cows often play a prominent role in Hindu society.Cow's milk is a good source of protein and calcium, as well as nutrients including vitamin B12 and iodine. It also contains magnesium, which is important for bone development and muscle function, and whey and casein, which have been found to play a role in lowering blood pressure.

Among the animal diseases which affect the profitability of rearing animals, mastitis is considered to be one of the expensive diseases in terms of production losses. Mastitis is a common disease entity of dairy cows, accompanied by physical, chemical, pathological and bacteriological changes in milk and glandular tissue. The disease is usually classified as subclinical, acute, subacute and chronic based on aetio-pathological findings and observations. Mastitis in domestic dairy cattle causes economic losses. The economic problems caused by mastitis are related to direct and indirect losses.

The majority of mastitis cases are bacterial and other infections such as mycoplasms, fungi, yeasts, virus, and chlamydia. Mastitis is divided into clinical and subclinical form. In clinical mastitis, the risk of contamination can be stopped to separate the animal from the herd, but the subclinical mastitis continues to flock because the animal does not show clinical signs and symptoms, and mastitis causes the other animals to catch up. As a result, the economic losses are getting bigger. The subclinical form of mastitis in dairy cows is important because this form 15 to 40 times more prevalent than the clinical form usually precedes the clinical form, of long duration and difficult to detect. There are many viral agents associated with bovine mastitis and which may cause or play important role in subclinical mastitis in dairy cattle.

Bovine Herpesvirus (BHV-1), Bovine Parainfluenza 3 (BPIV-3) virus, Bovine Papillomaviruses could cause or play a role in clinical and subclinical mastitis.The Bovine Papilloma viruses (BPV) belong to the Papillomaviridae family. BPV-1, BPV-2, and BPV-13 can infect and cause the development of teat tumor in cattle. BPV can cause the fibropapillomas in the ductuspapillaris, this virus could demonstrate a predisposition in cattle with mastitis. Six types of BPV have been characterized, of which BPV-1 cause frond fibropapilloma of udder and teat, BPV type 1-11can cause teat warts in dairy cattle. BPV-5 cause rice grain fibropapilloma of udder and BPV-6 cause frond epithelial papilloma of the bovine udder and teat.In cattle, bovine papilloma virus (BPV) is the causative agent of cutaneous and teat papillomatosis, cancers of the upper gastrointestinal tract and urinary bladder. The papilloma virus, which usually appear as multiple, sessile or pedunculated, circumscribed grey white to dark brownish black outgrowth may appear on skin over different body parts. However, neck, eyelids, teats and lower line of abdomen are the most common sites. It is a contagious disease, usually

transmitted via direct contact, contaminated food and equipment, flies, castration and injections.Papillomas on teats may cause difficulty in milking and suckling by calf and sometimes, pedunculatedpapillomas snap-off causing mastitis and teat infections.

However, since viral infections have not been much investigated in mastitis studies, strategies developed against subclinical mastitis may be inadequate.Treatment of mastitis mainly relies on antibiotics. However, the long-term use of antibiotics in dairy cows has led to increased drug resistance of the pathogens causing mastitis. Therefore, alternative methods for the elimination of pathogenic microorganisms causing mastitis are being investigated. Such methods include the use of nanotechnology, bacteriophage therapy, plant extracts, proteins of animal origin and bacteriocins. The main advantage of these solutions is that pathogens do not become resistant to the substances used. Thus, they may in the future become the main forms of mastitis therapy. In vitro and in vivo studies of alternative treatments for mastitis have revealed successful inhibition of growth and destruction of many pathogens responsible for this disease. Antibacterial agents from plants can act as important sources of novel antibiotics, efflux pump inhibitors, compounds that target bacterial virulence or can be used in combination with existing drugs. The plants form an essential component of ethnoveterinary medicine used in the treatment of different diseases like bovine mastitis.

CASE HISTORY AND DIAGNOSIS :

A six yearold pregnant Jersey cross bred cow (Fig. 1) was referred to Department of Veterinary Medicine, COVAS,Parbhani with the history of skin lesions on udder and teat with swollen udder. While milking due to skin lesions on udder get ruptured from udder makes difficulty in milking.After clinical examinationrevealed filiform type cutaneous warts on all teats (Fig. 2 & 3).

Fig.1: Jersey cross bred cow presented to clinic

Fig.2 : Multiple cutaneous growths on udder and teat

Fig.3 : Papilloma lesions on teat of cow

Fig.4 : positive CMT test of cow

The physiological parameters like temperature, heart and respiration rate was within the normal range. Physical examination of milk revealed normal colour, odour and consistency.California Mastitis Test revealed gel formation adhering to CMT plate (Fig. 4). As per history, detail clinical examination, CMT test, typical clinical lesions of wart, the case was diagnosed as subclinical mastitisalong withbovine teat papillomatosis.

TREATMENT AND DISCUSSION :

The cow was treated with Inj. Ceftriaxone-Tazobactum@10 mg/kg bwim, Inj. Meloxicam @ 0.5mg/kg bwim,Inj. Chlorphenaramine maleate@ 0.5mg/kg bwim for 3 days. Thuja occidentalis (Thuja-30) @ 10 drops orallyBID and Thuja ointment locally BID for 3 weeks.It was advised toused by adding 10 drops on a lump of Jaggery orally twice a day for

15 days and asked the owner to get their cowreviewed after 4 weeks of treatment. After 2nd week of treatment regression of nodule noticed(Fig.5). After treatment, the papilloma growths showed signs of regression. Whereas, after 3rd week of treatment, teat becomes soft on palpation and regressed nodules observed (Fig.6) and only light black colored scars were seen at the sight of the growth .The animal was under observation for four weeks after therapy with negative Calfornia Mastitis Test. By the end of four weeks all the papilloma growths were completely disappeared with normal milk secretion.

Thujaoccidentalis is a quite common small doom shaped plant found in orchards or gardens. Thuja-30 potency drug was prepared from the mother tincture of its leaves. Papillomatous warts are especially menableto this drug (Fig. 9). It is indicated for the treatment of polyp andepithelioma. This wonderful effect may be ascribed to its various chemical constituents i.e.Dextro-pinene, Dextro- thujone, thujine, laevo-fenchone and pinpierin.Plant derivative homoeopathic preparation available in market with a brand name of Thuja-30 for humans.BPV-1 and 10 are involved in production of rice grain-like and sessile elevated growths on the teats of cattle. Teat papillamatosis can be cured more efficiently when Levamisole given in treatment along with auto-hemotherapy without using any chemical agent, auto-hemotherapy can be effectively employed to treat bovine teat papillomatosis.

Mastitis is the most common disease in dairy cows and alternative solutions to antibiotics have to be found for its treatment. The growing resistance to antibiotics in pathogens causing mastitis decreases the effectiveness of treatment and often leads to preterm culling of cows that cannot be cured, resulting in huge financial losses for dairy farms.

Fig.5: Regression of nodules (after 2nd week of treatment)

Fig.6: Regression of nodules (after 3rd week of treatment)

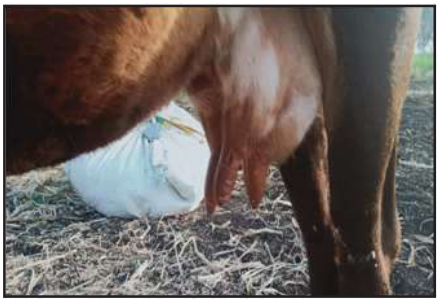

Fig.7: Complete Recovery of warts on teat (after 4th week of treatment)

Fig.8: Complete Recovery of cow

Fig. 9:Thujaoccidentalis -Leaves and immature cones

CONCLUSION :

Alternative therapy with Thujaoccidentalisfor wart related subclinical mastitis was done successfully without any untoward reaction.

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The use of essentials oils to support respiratory function in broilers

Melanie Frisch, Biochem Zusatzstoffe Handels- und Produktionsges. mbH, Lohne, Germany

Essential oils are active ingredients that are derived from plant extracts. They are traditionally known for their positive effects on health. Among the various indications for their use, the application during respiratory challenges in poultry has been proven. In combination with conventional treatments or as a preventive, they can help to alleviate symptoms and facilitate breathing. At the same time, they have demonstrated their antimicrobial activities in several in-vitro studies.

Essential oils are water soluble plant extracts that are often made up of different components. Some frequently used essential oils in animal husbandry are for example eucalyptus and peppermint oil, but others such as from oregano, garlic, and aniseed are used as well, to name just a few. These substances are associated with different positive effects, like an antimicrobial activity or a positive influence on respiration and digestion. Sometimes, it is just one of the chemical components of an essential oil which is responsible for its efficacy, therefore it becomes extracted and concentrated. Only the natural essential oils and their extracts show the desired high activity, their synthetic counterparts remain largely ineffective. Some examples of these highly effective components are menthol and 1,8-cineol. The amounts of these concentrated components in an essential oil vary, depending on the origin of the plants they are extracted from, and are critical for determining the quality of supplemental feedstuffs.

In times of a more sensitized discussion of antibiotic use and the emerging of resistant bacteria, using essential oils as alternative or supportive treatment to conventional methods is gaining relevance. This is mirrored in the increased research about the efficacy of essential oils or their components. Most people have already experienced the alleviating effects that menthol has on a stuffy nose, and essential oils have been used in traditional medicine for centuries. In recent years, the beneficial use of essential oils in commercial poultry farming has been examined more closely. A plethora of scientific studies have emerged that show the various positive influences in poultry.

Natural peppermint and eucalyptus oils are commonly used to alleviate respiratory symptoms. They have the ability to thin mucus and thus facilitate its removal from the airways. In combination with their antispasmodic and expectorant properties, the airways are cleared and breathing becomes easier during infection. One of the components of eucalyptus oil, 1,8-cineol, has also shown anti-inflammatory and immune-stimulating effects and reduced panting rates in trials. These effects are also beneficial to the animals during hot and dry summer periods, when increased dust pose an additional burden for the airways and the panting rates increase with rising temperatures.

Menthol is most commonly known for its cooling effect. It activates certain receptors on the mucous membranes, the cold receptors, which creates a cooling effect and fosters a feeling of facilitated air intake. The animals benefit from this effect not only when congested, but also during heat stress situations.

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In addition to the various effects on the respiratory systems, many essential oils have also demonstrated antimicrobial properties. Several in vitro studies have shown good inhibitory effects against bacteria, viruses, and fungi. In one study, in which a peppermint solution was fogged in a broiler house, the antimicrobial effects of this essential oil were confirmed through a reduced bacterial count on surface areas. Many other studies have confirmed the antimicrobial effects of highly concentrated essential oils: they are able to permeate cell membranes and disturb the energy metabolism of the bacterial cell. The strongest effects can be seen against gram-positive bacteria.

In combatting respiratory symptoms, products like **BronchoVest** use the combined synergistic effects of these active components. Not only does it alleviate respiratory symptoms, but the antimicrobial effects may also have a positive influence on decreasing pathogen pressure. Especially in virus-related respiratory diseases and when the immune system is challenged during stress situations, damaged mucous membranes are susceptible to bacterial superinfections.

Respiratory ailments in poultry often result in a reduced feed efficiency and can ultimately lead to a reduced performance and higher mortality rates. Animals with an impaired respiratory system show lower oxygen concentrations in the blood, leading to discomfort, a reduced vitality and lowered feed intake. For affected flocks, a treatment with **BronchoVest**, rich in natural essential oils and effective components menthol and 1,8-cineol, is indicated to support treatment and restore respiratory function.

The application can take place via drinking water with a dosage of 100 to 200 ml **BronchoVest** per ton of water, ideally starting at the slightest onset of respiratory symptoms, and last for 5 days or until symptoms have disappeared. Another effective method is a spray application, for which 100 to 200 ml **BronchoVest** are dissolved in 10 liters of fresh, clean water per 20.000 animals and sprayed 2 to 4 times per day. During anticipated peak temperatures, **BronchoVest** can be given for 3 to 4 days, starting one day prior to heat stress.

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Strategic Mineral Supplementation in Layer and Breeder Hens

Melanie Frisch, technical manager IMEA at Biochem Zusatzstoffe

In layer and breeder flocks, the eggshell quality is a closely monitored quality criterium. Cracked and broken eggs are the major cause of downgrading eggs, negatively impacting the number of usable eggs. In breeders, undetected microcracks are one of the causes of a reduced hatching rate and impaired chick quality.

Eggshell parameters are influenced not only by the genetic of the hen, but also through nutrition, mineral supply, health status and management factors. When addressing eggshell quality issues, the first focus is usually on the calcium supply of the hen. It makes up the major component of the eggshell.

But the supply with other minerals is just as crucial and their relevance for eggshell stability oftentimes underestimated. One key player is phosphorus. Its metabolism is closely intertwined with that of calcium. Being one of the most important building blocks of life, the presence and availability of this element is limited though. That is why taking a closer look at the phosphorus supply of poultry is so important.

Both layer and breeder farms will benefit from a good eggshell strength

Mineral Bioavailability

The presence of phytate in the diets is a limiting factor for the bioavailability of native phosphorus sources. Therefore, the use of phytases is common and well-established practice. Continuous research and further development of this helpful additive is contributing greatly to increasing phosphorus bioavailability.

An oftentimes overlooked aspect in the discussion of phosphorus supply is the varying demand of this mineral by the animal throughout the day. During eggshell formation at nighttime, while there is no feed intake, the calcium demand is covered by degradation of hydroxyapatite from medullary bone. Due to its concurrent release, the phosphorus levels also rise. But since there is no demand at the moment of its release, this valuable mineral has to be excreted via the urine. Once feed intake commences in the morning, the eggshell formation comes to an end and the available calcium from the diet can be deposited in the bone. Sufficient phosphorus needs to be present as it is also needed for bone formation. Hence, phosphorus demand is the highest in the morning hours of the day, while the mineral deposits in the bone are replenished. This has been confirmed by Keshavarz in 1998[1], who demonstrated that voluntary phosphorus intake was indeed higher in the morning when hens were offered a choice of feeds. [2]

[1] Keshavarz, K. (1998) Investigation on the possibility of reducing protein, phosphorus, and calcium requirements of laying hens by manipulation of time of access to these nutrients. Poultry Science 77, 1320–1332.

[2] Vitti, D. M., & Kebreab, E. (Eds.). (2010). Phosphorus and calcium utilization and requirements in farm animals. CABI.

With this knowledge in mind, it only makes sense to increase the phosphorus supply of layers and breeders in the first half of the day. With progressing age, the mineral deposits in the medullary bone become more and more depleted. A targeted supplementation at the beginning of lay aids during this metabolic transition, while older hens can be supported to reduce the risk of osteoporosis, when not enough bone substance can be replenished otherwise. In any case, the eggshell quality will benefit.

While it is impracticable to vary the amount of phosphorus in the feed during the day, the provision of highly bioavailable phosphorus sources via the drinking water is an easy and effective tool to implement on almost any farm. Biochem's product LiquiPhos® Strong was developed for this use and provides one of the highest concentrations of phosphorus in a liquid supplement on the market. The following field trial demonstrates its efficacy on eggshell strength at interval use.

Field trial

A commercial Cobb broiler breeder flock with 21,200 females was equally divided into four groups. Two groups, T1 and T2, were treated with LiquiPhos® Strong in weeks 41 and 42 of age and two groups were left as a control C1, C2. The measurements of eggshell thickness were taken regularly from week 37 up to 44 weeks of age. Samples of 10 eggs from every group were taken once a week and measurements were taken by micrometer. The dosage of LiquiPhos® Strong was 1 ml/liter drinking water in the first half of the day over five consecutive days per treatment week.

The measurements in the weeks before the first application (week 37 until week 40) of LiquiPhos® Strong (pre-period) showed an average eggshell thickness of 0.330 mm for the trial groups and 0.3365 mm for the control groups. In the second half the trial (week 41 until week 44), deviations in these values were noted. The trial groups showed an average increase in eggshell thickness by 1.2 %, while the control groups showed an average decrease by 2.04 %.

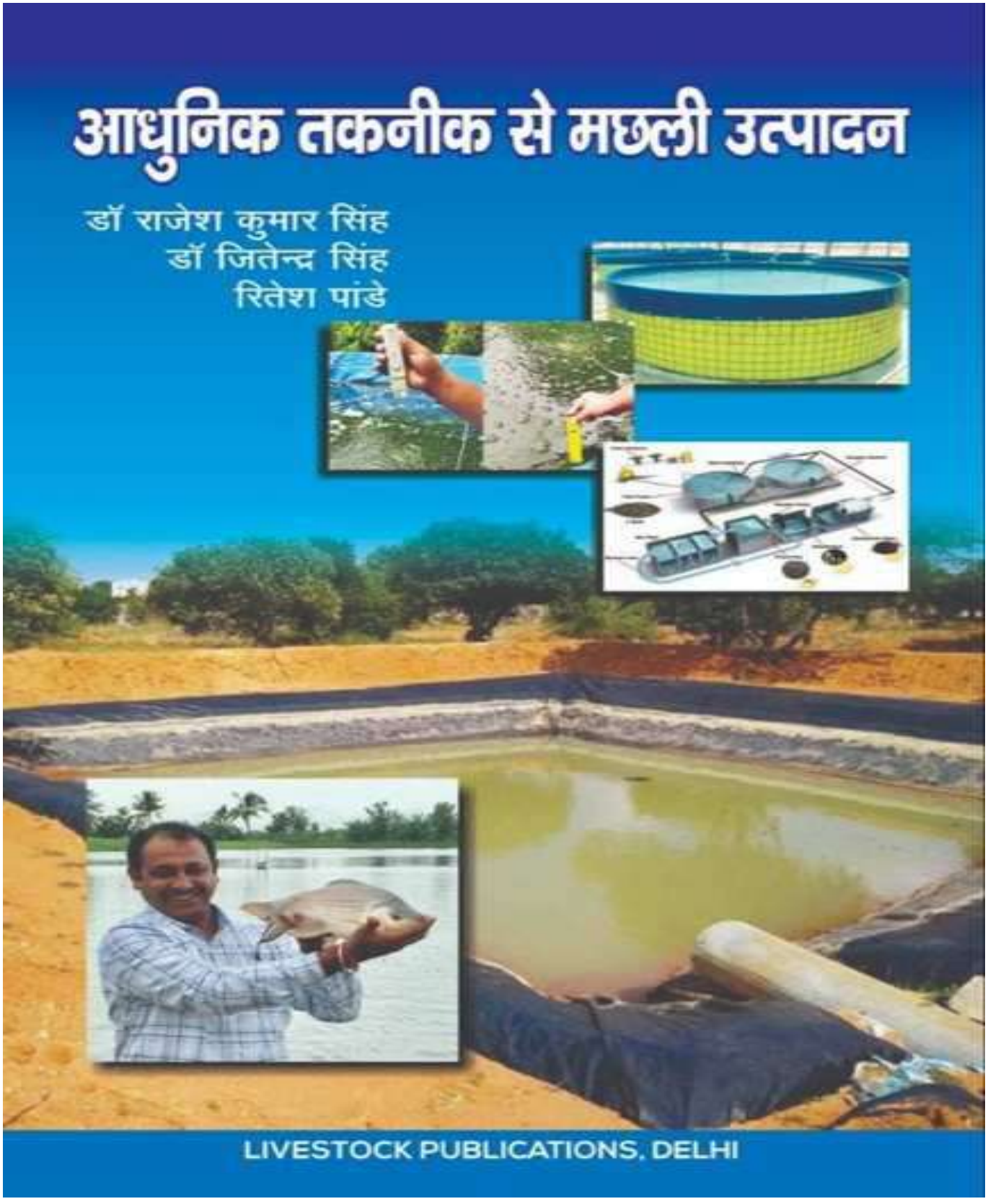
Table 1: Results of eggshell thickness. Averages of 10 eggs per group per week. Measurement in mm.

Group	Pre-Period	Trial Period	Difference %
T1	0.325	0.328	+0.92
C1	0.338	0.334	[illegible]
T2	0.335	0.340	+1.49
C2	0.335	0.325	[illegible]

The field trial clearly demonstrated that supplementation of LiquiPhos® Strong via the drinking water for just two treatment intervals results in improved eggshell thickness, an indicator for eggshell stability.

Conclusion

With increasing age of layer and broiler breeder hens, the egg weight and size naturally increase. At the same time, the eggshell does not adapt in equal parts: the same amount of eggshell mass must cover a much larger egg, resulting in a thinner eggshell. The daily phases of mobilization and deposition of calcium are crucial for eggshell quality but gain a long-term risk for reduced bone stability. Counteracting this phenomenon with strategic supplementation of phosphorus can be a tool to maintain the productivity and longevity of layer and breeder hens.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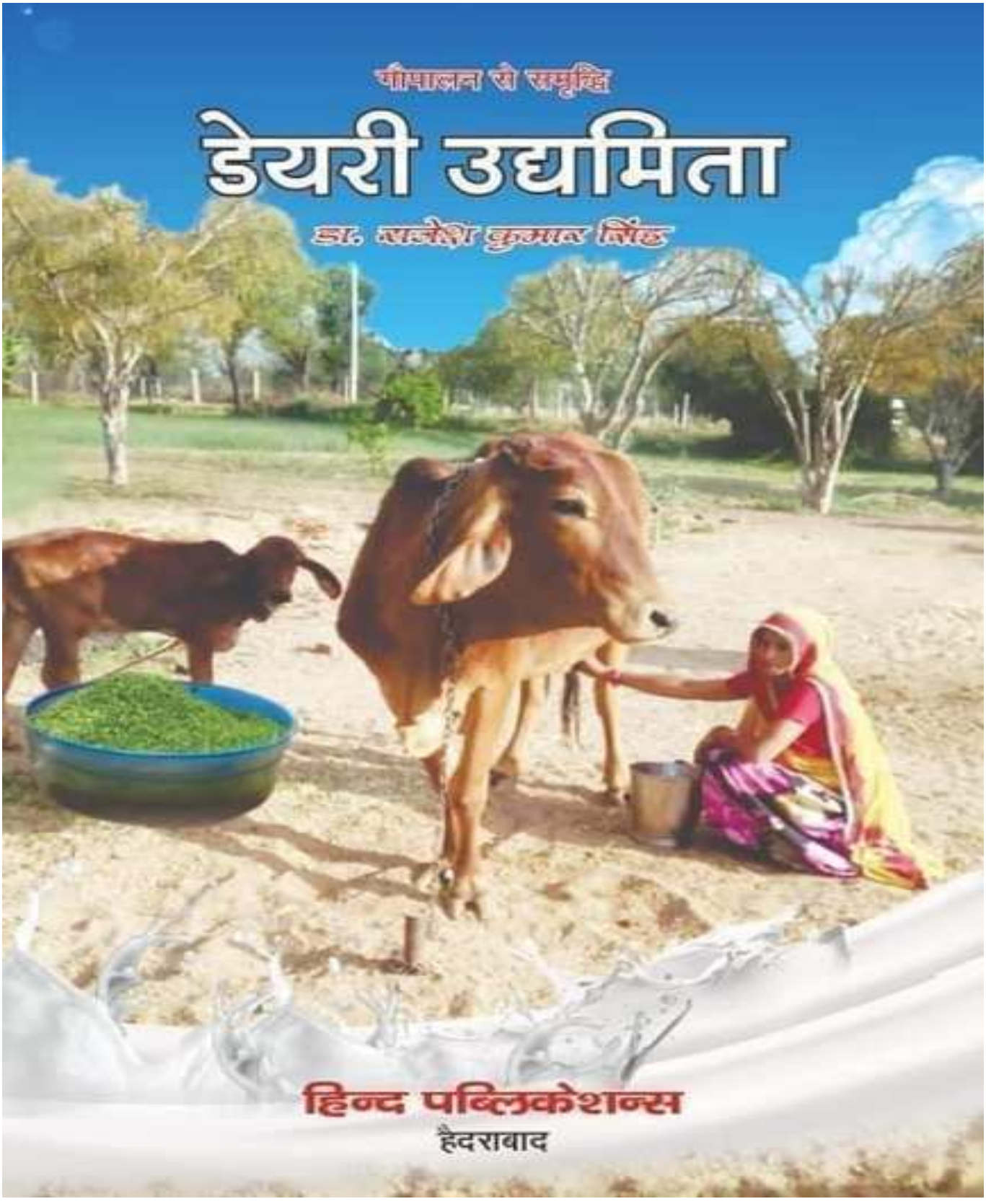
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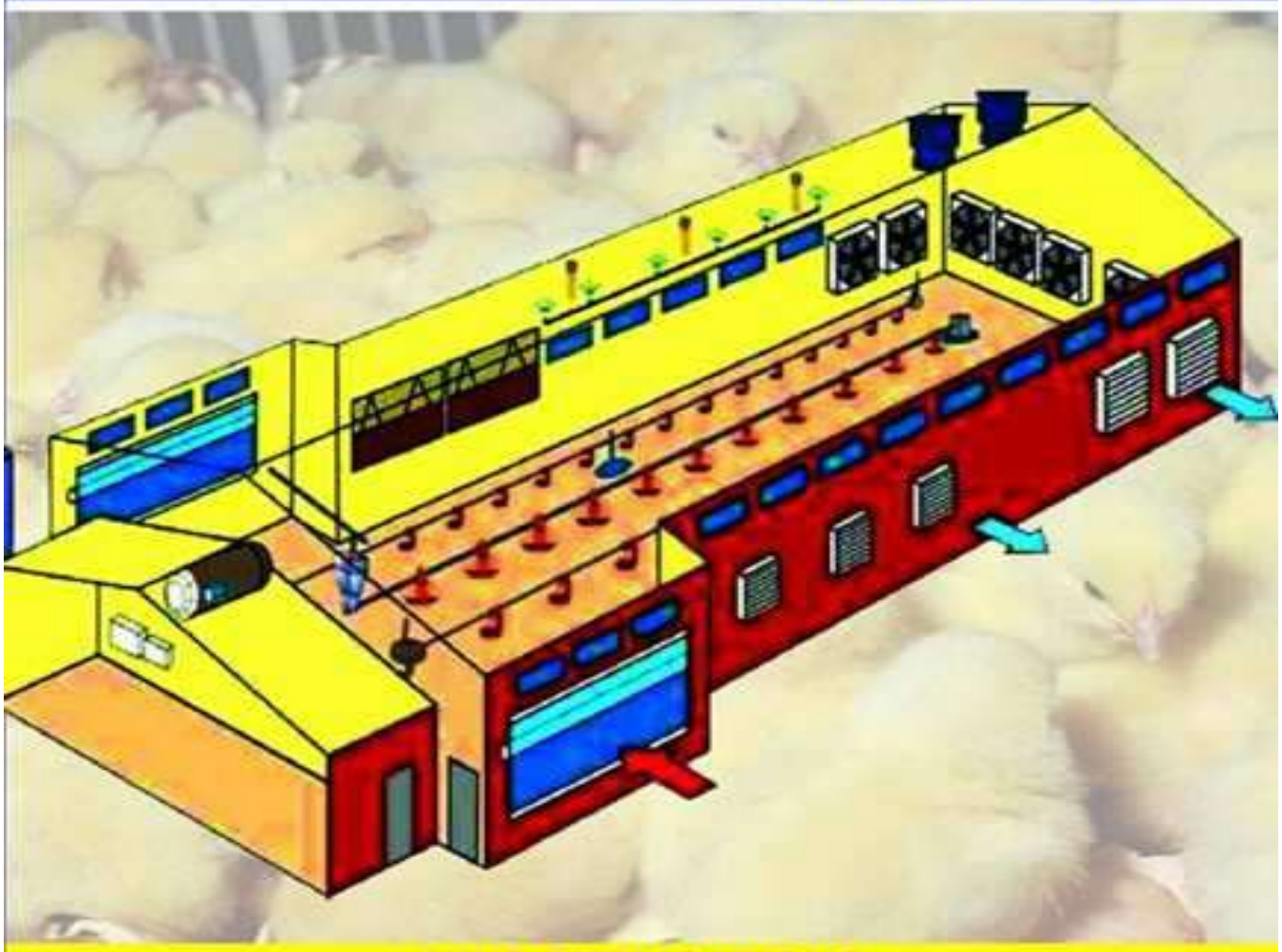

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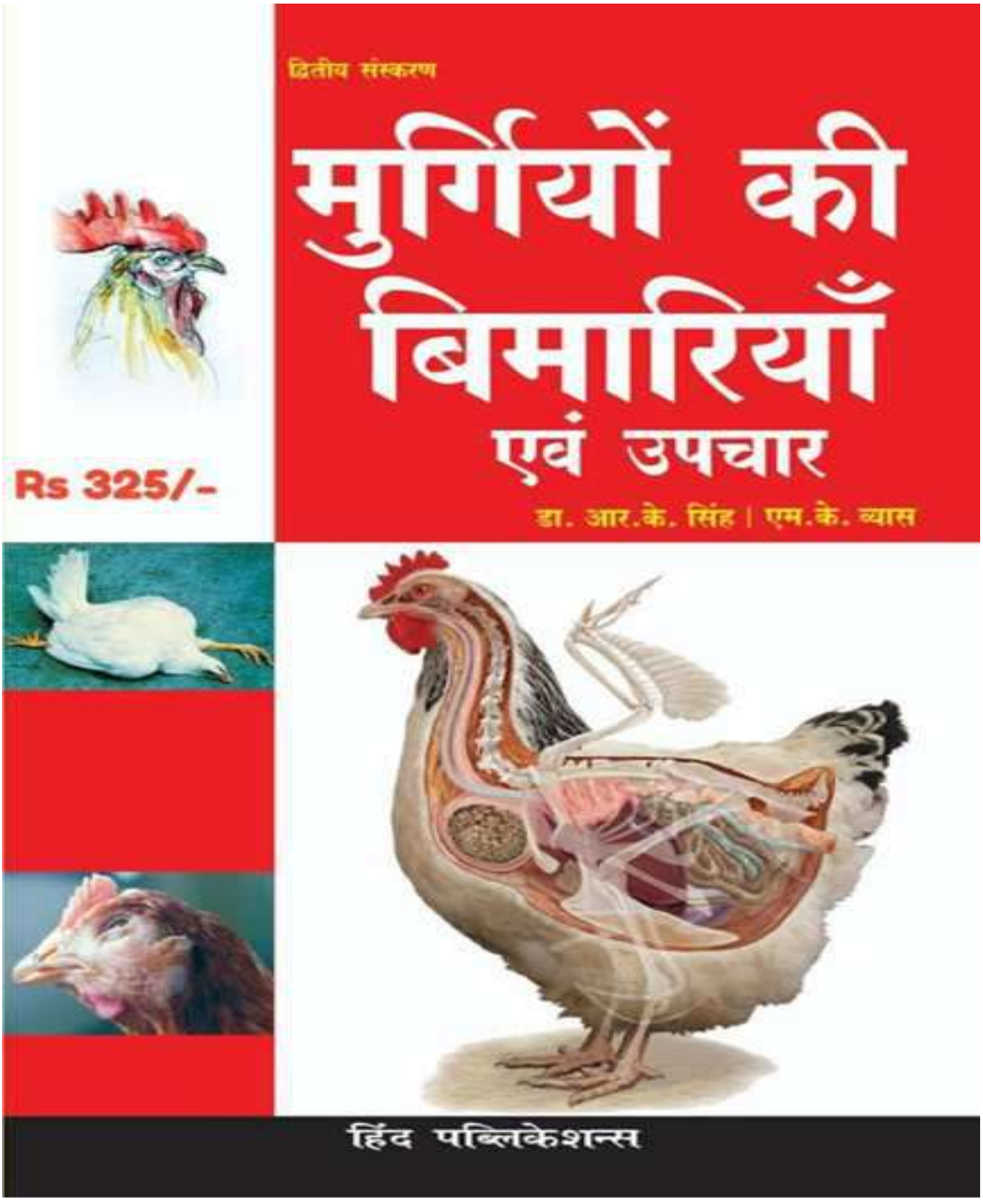
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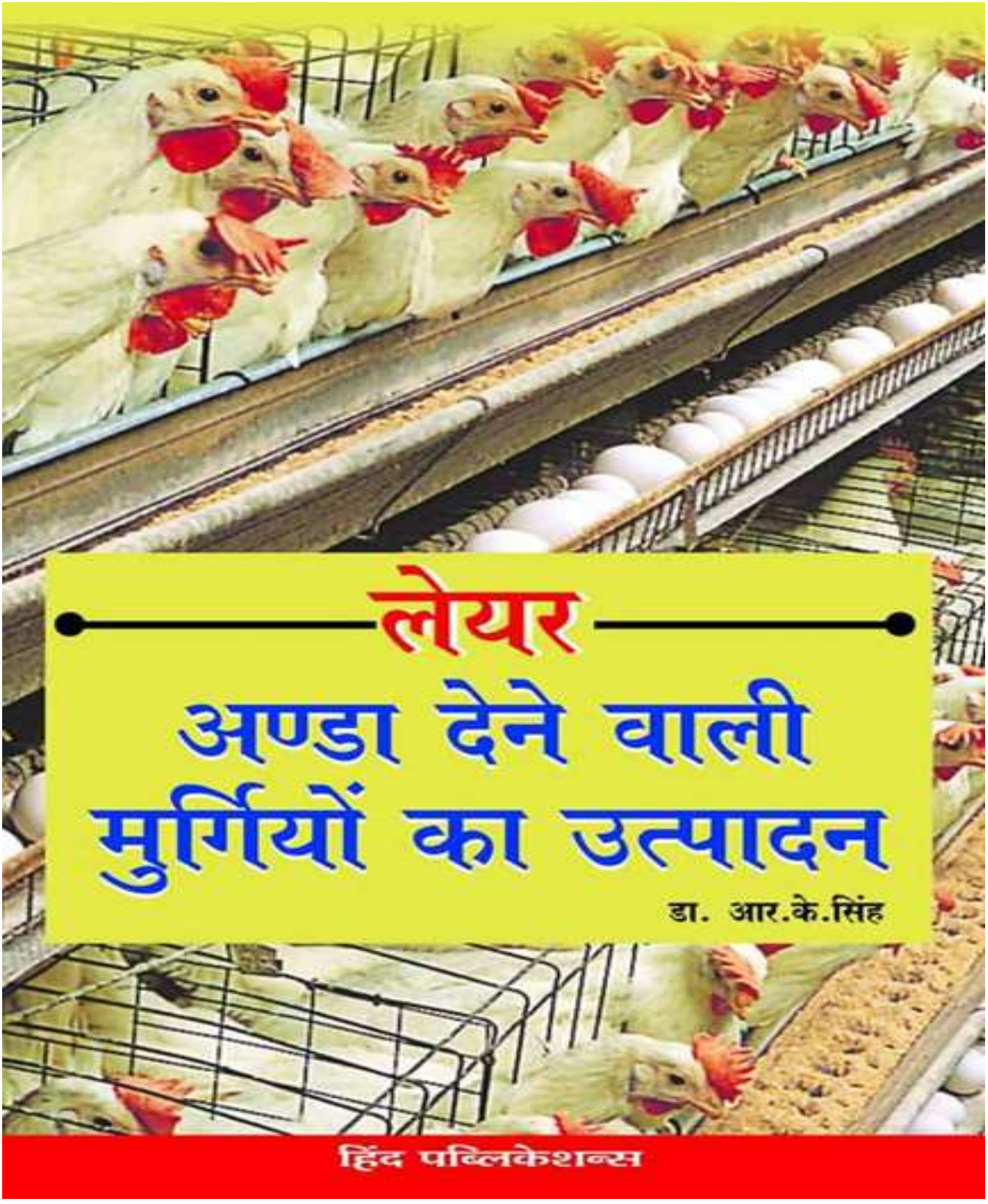
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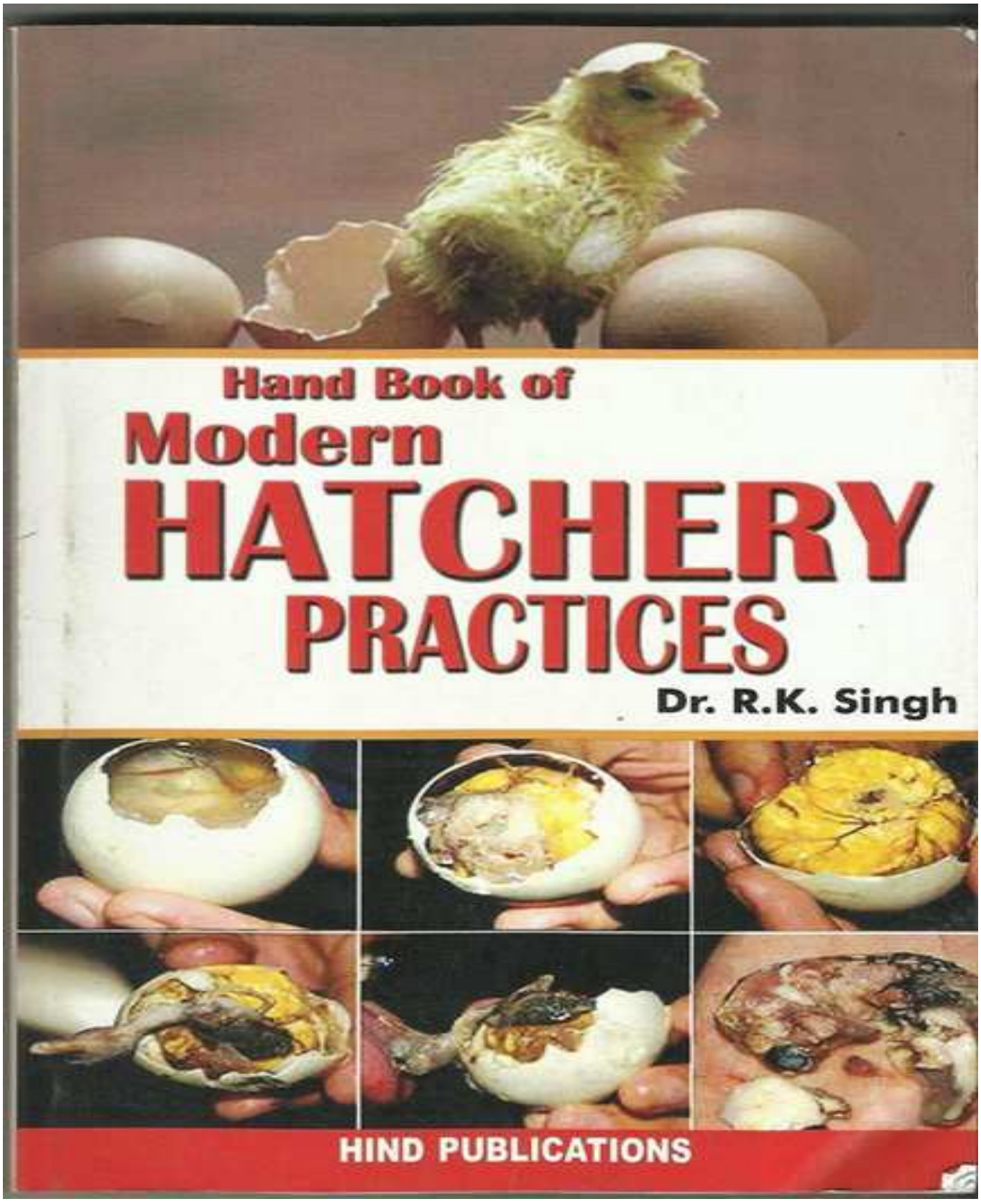
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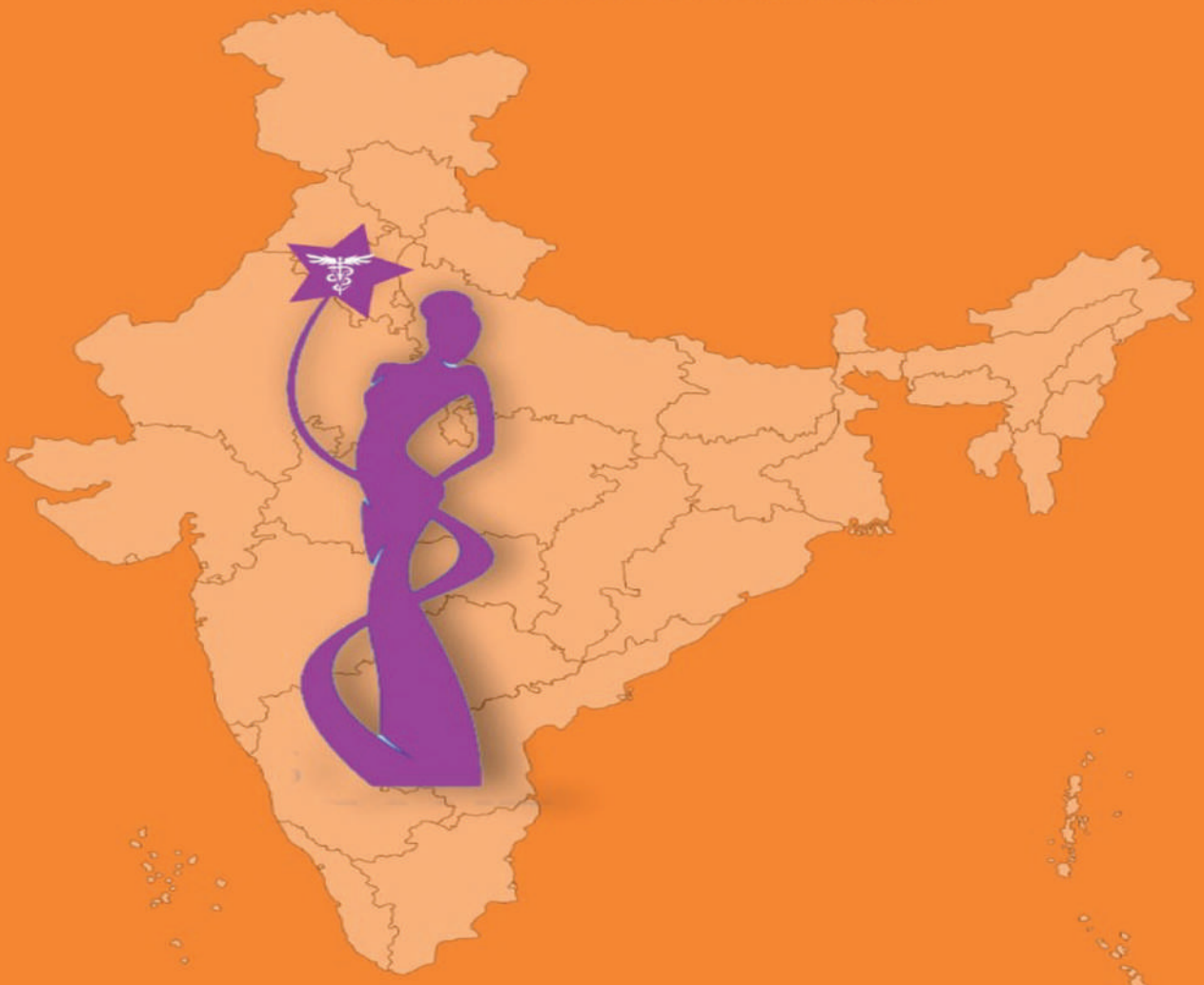

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